

COMPLIANT

HALOGEN FREE

Ultralow V_F Hyperfast Rectifier for Discontinuous Mode PFC, 15 A FRED Pt[®]



TO-220 FullPAK 2L



VS-15ETL06FP-N3

PRIMARY CHARACTERISTICS				
I _{F(AV)}	15 A			
V _R	600 V			
V _F at I _F	0.85 V			
t _{rr} typ.	60 ns			
T _J max.	175 °C			
Package	TO-220 FullPAK 2L			
Circuit configuration	Single			

FEATURES

- Hyperfast recovery time
- · Benchmark ultralow forward voltage drop
- 175 °C operating junction temperature
- · Low leakage current
- Fully isolated package (V_{INS} = 2500 V_{RMS})
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishav.com/doc?99912

DESCRIPTION

State of the art, ultralow V_F , soft-switching hyperfast rectifiers optimized for Discontinuous (Critical) Mode (DCM) Power Factor Correction (PFC).

The minimized conduction loss, optimized stored charge and low recovery current minimize 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.

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V _{RRM}		600	V
Average rectified forward current	I _{F(AV)}	T _C = 120 °C	15	
Non-repetitive peak surge current	I _{FSM}	T _J = 25 °C	250	Α
Peak repetitive forward current	I _{FM}		30	
Operating junction and storage temperatures	T _J , T _{Sta}		-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}	Ι _R = 100 μΑ	600	-	-	.,
Farmer describer and the second secon	I _F = 15 A	-	0.99	1.05	V	
Forward voltage	V _F	I _F = 15 A, T _J = 150 °C	-	0.85	0.92	
Reverse leakage current	-	$V_R = V_R$ rated	-	0.1	10	
neverse leakage current	I _R	$T_J = 150 ^{\circ}\text{C}, V_R = V_R \text{rated}$	-	15	120	μΑ
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	-	nΗ



DYNAMIC RECOVERY CHARACTERISTICS (T _C = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
	I _F		$I_F = 1 \text{ A}, dI_F/dt = 100 \text{ A/}\mu\text{s}, V_R = 30 \text{ V}$		60	120	
Povorco rocovory timo	+	$I_F = 15 \text{ A}, dI_F/dt = 100 \text{ A/}\mu\text{s}, V_R = 30 \text{ V}$		-	190	270	ns
Reverse recovery time t _{rr}	T _J = 25 °C	1 45 A	-	220	-		
	T _J = 125 °C		-	320	-		
Peak recovery current I _{RRM}	1	T _J = 25 °C	$I_F = 15 \text{ A}$	-	19	-	Α
	T _J = 125 °C	dI _F /dt = 200 A/µs V _B = 390 V	-	26	-		
Reverse recovery charge Q _{rr}	0	T _J = 25 °C	vR = 290 v	-	2.2	-	uС
	T _J = 125 °C		-	4.3	-	μΟ	

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}		-	3.0	3.5	
Thermal resistance, junction-to-ambient per leg	R _{thJA}	Typical socket mount	-	-	70	°C/W
Thermal resistance, case-to-heatsink	R _{thCS}	Mounting surface, flat, smooth, and greased	-	0.5	-	
Weight			-	2.0	-	g
weight			-	0.07	-	OZ.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-220 FullPAK 2L	15ETL06FP			

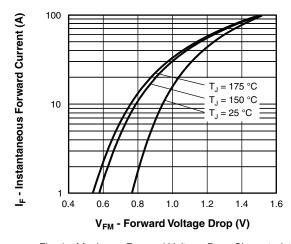


Fig. 1 - Maximum Forward Voltage Drop Characteristics

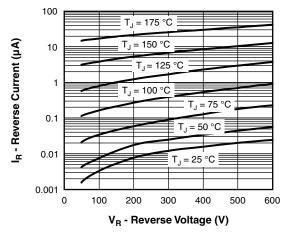


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

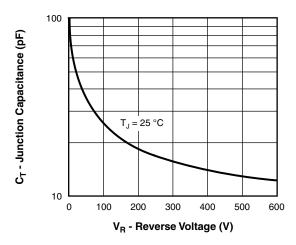


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

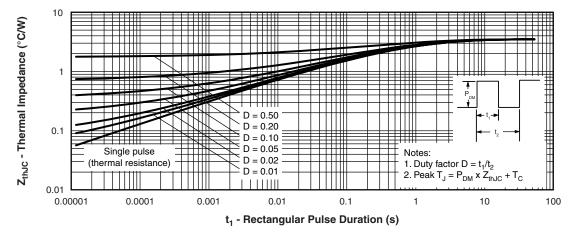


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

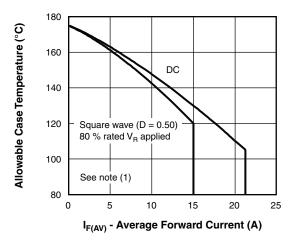


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

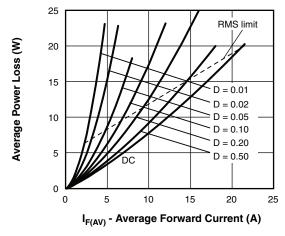


Fig. 6 - Forward Power Loss Characteristics

Note

⁽¹⁾ Formula used: T_C = T_J - (Pd + Pd_{REV}) x R_{thJC}; Pd = forward power loss = I_{F(AV)} x V_{FM} at (I_{F(AV)}/D) (see fig. 5); Pd_{REV} = inverse power loss = V_{R1} x I_R (1 - D); I_R at V_{R1} = rated V_R

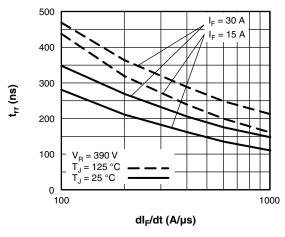


Fig. 7 - Typical Reverse Recovery Time vs. dl_F/dt

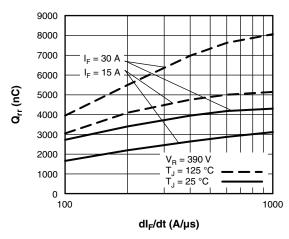
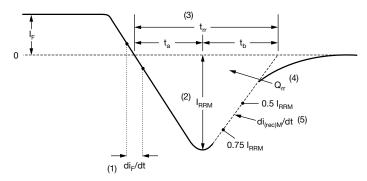


Fig. 8 - Typical Stored Charge vs. dl_F/dt



- (1) di_F/dt rate of change of current through zero crossing
- (2) I_{RRM} peak reverse recovery current
- (3) $\rm t_{rr}$ reverse recovery time measured from zero crossing point of negative going $\rm l_F$ to point where a line passing through 0.75 $\rm l_{RRM}$ and 0.50 $\rm l_{RRM}$ extrapolated to zero current.
- (4) $\mathbf{Q}_{\rm rr}$ area under curve defined by $\mathbf{t}_{\rm rr}$ and $\mathbf{I}_{\rm RRM}$

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

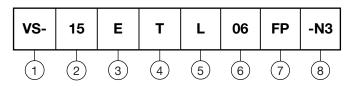
(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

2 - Current rating (15 = 15 A)

3 - E = single

T = TO-220, D²PAK (TO-263AB)

5 - L = ultralow V_F hyperfast recovery

6 - Voltage rating (06 = 600 V)

7 - FP = TO-220 FullPAK 2L

8 - Environmental digit:

-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)					
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION		
VS-15ETL06FP-N3	50	1000	Antistatic plastic tube		

LINKS TO RELATED DOCUMENTS				
Dimensions	www.vishay.com/doc?96157			
Part marking information	www.vishay.com/doc?95392			
SPICE model	www.vishay.com/doc?96052			



2L TO-220 FullPAK

DIMENSIONS in millimeters









Bottom view



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