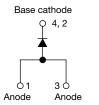
Vishay Semiconductors

Ultralow V_F Ultrafast Rectifier, 15 A FRED Pt®



DPAK (TO-252AA)





VS-15AWL06FN-M3

VS-15EWL06FN-M3

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	DPAK (TO-252AA)					
Circuit configuration	Single					

FEATURES

 \bullet Ultrafast recovery time, extremely low V_{F} and soft recovery



• 175 °C maximum operating junction temperature

For PFC DCM operation

COMPLIANT
HALOGEN
FREE

- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see <u>www.vishav.com/doc?99912</u>

DESCRIPTION / APPLICATIONS

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.

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 = 148 °C	15				
Non-repetitive peak surge current	I _{FSM}	T _J = 25 °C	180	Α			
Peak repetitive forward current	I _{FM}	T _C = 148 °C, f = 20 kHz, d = 50 %	30				
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	-	-	.,	
Forward voltage	V	I _F = 15 A	-	0.99	1.05	V	
	V_{F}	I _F = 15 A, T _J = 150 °C	-	0.85	0.92		
Poverse leakage ourrent		$V_R = V_R$ rated	-	-	10		
Reverse leakage current	IR	$T_J = 150 ^{\circ}\text{C}, V_R = V_R \text{rated}$	-	-	120	μA	
Junction capacitance	C _T	V _R = 600 V	-	11	-	pF	
Series inductance	L _S	Measured lead to lead 5 mm from package body	-	8	-	nH	

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DYNAMIC RECOVERY CHARACTERISTICS (T _J = 25 °C unless otherwise specified)									
PARAMETER	SYMBOL	TEST CO	MIN.	TYP.	MAX.	UNITS			
		$I_F = 1 A, dI_F/dt = 10$	00 A/μs, V _R = 30 V	-	60	120			
Reverse recovery time	+	$I_F = 15 \text{ A}, dI_F/dt = 100 \text{ A/}\mu\text{s}, V_R = 30 \text{ V}$		-	190	-			
Reverse recovery time	t _{rr}	T _J = 25 °C	I _F = 15 A dI _F /dt = 200 A/μs V _R = 390 V	-	220	-	ns · Α · μC		
		T _J = 125 °C		-	290	-			
Pook rocoveny current	I _{RRM}	T _J = 25 °C		-	21	-			
Peak recovery current		T _J = 125 °C		-	25	-			
Reverse recovery charge	0	T _J = 25 °C		-	2.6	-			
	Q_{rr}	T _J = 125 °C		-	4	-			

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}		-	1.4	1.8	°C/W	
Thermal resistance, junction to ambient	R _{thJA}		-	-	70	C/VV	
Approximate weight				0.3		g	
Approximate weight				0.01		OZ.	
Marking daviso	O		15AWL06FN				
Marking device		Case style DPAK (TO-252AA)		15EWL06FN			

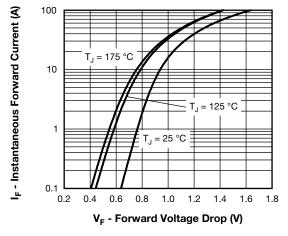


Fig. 1 - Typical Forward Voltage Drop Characteristics

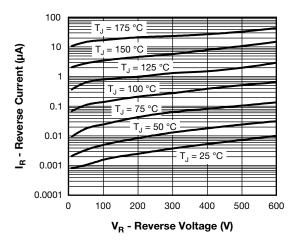


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

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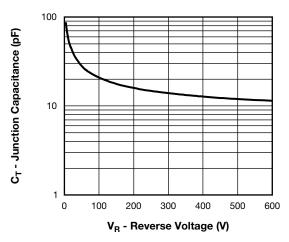


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

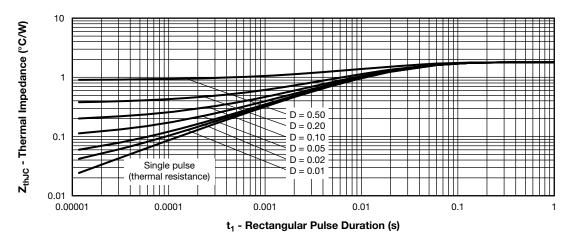


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

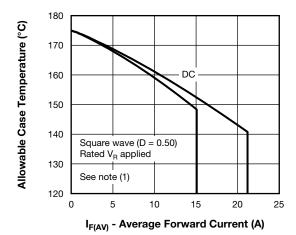


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

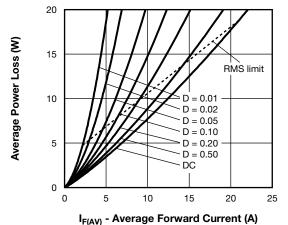


Fig. 6 - Forward Power Loss Characteristics

Note

⁽¹⁾ Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$; $Pd = forward power loss = I_{F(AV)} \times V_{FM} at (I_{F(AV)}/D)$ (see fig. 6); $Pd_{REV} = inverse power loss = V_{R1} \times I_R (1 - D)$; I_R at $V_{R1} = rated V_R$

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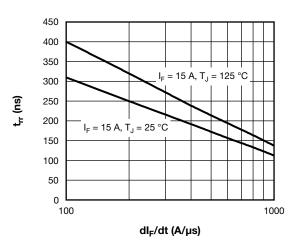


Fig. 7 - Typical Reverse Recovery Time vs. dl_F/dt

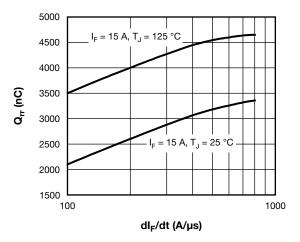
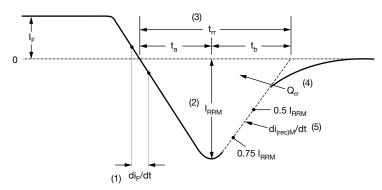


Fig. 8 - Typical Stored Charge vs. dl_F/dt



- (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 $\rm I_F$ to point where a line passing through 0.75 $\rm I_{RRM}$ and 0.50 $\rm I_{RRM}$ extrapolated to zero current.
- (4) $\rm Q_{rr}$ area under curve defined by $\rm t_{rr}$ and $\rm I_{RRM}$

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

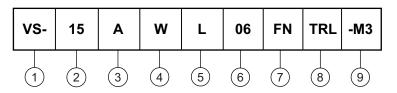
(5) di_{(rec)M}/dt - peak rate of change of current during t_b portion of t_{rr}

Fig. 9 - Reverse Recovery Waveform and Definitions

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ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

2 - Current rating (15 = 15 A)

3 - Circuit configuration:

• A = single diode (2 anodes)

• E = single diode

4 - Package identifier:

W = DPAK

5 - L = hyperfast rectifier

6 - Voltage rating (06 = 600 V)

7 - FN = TO-252AA

8 - • None = tube

• TR = tape and reel

• TRL = tape and reel (left oriented)

• TRR = tape and reel (right oriented)

9 - Environmental digit:

-M3 = halogen-free, RoHS-compliant and terminations lead (Pb)-free

ORDERING INFORMATION (Example)						
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION				
VS-15AWL06FN-M3	75	Antistatia plastia tuba				
VS-15EWL06FN-M3	75	Antistatic plastic tube				
VS-15AWL06FNTR-M3	2000	13" diameter reel				
VS-15EWL06FNTR-M3	2000	13 diameter reei				
VS-15AWL06FNTRL-M3	3000	13" diameter reel				
VS-15EWL06FNTRL-M3	3000	13 diameter reei				
VS-15AWL06FNTRR-M3	3000	13" diameter reel				
VS-15EWL06FNTRR-M3	3000	13 diameter reei				

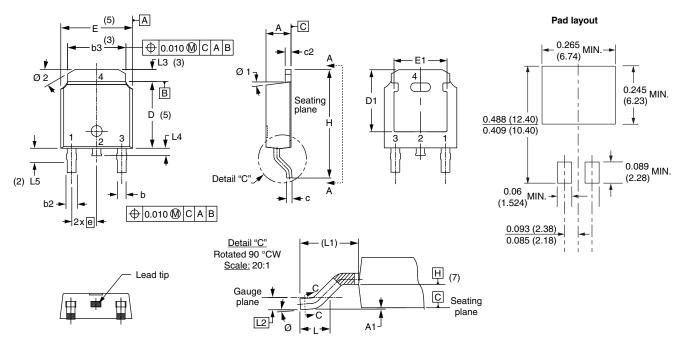
LINKS TO RELATED DOCUMENTS					
Dimensions	www.vishay.com/doc?95627				
Part marking information	www.vishay.com/doc?95176				
Packaging information	www.vishay.com/doc?95033				
SPICE model	www.vishay.com/doc?95372				



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D-PAK (TO-252AA) "M"

DIMENSIONS in millimeters and inches



SYMBOL	MILLIN	IETERS	INCHES		NOTES
STIVIDOL	MIN.	MAX.	MIN.	MAX.	NOTES
Α	2.18	2.39	0.086	0.094	
A1	-	0.13	-	0.005	
b	0.64	0.89	0.025	0.035	
b2	0.76	1.14	0.030	0.045	
b3	4.95	5.46	0.195	0.215	3
С	0.46	0.61	0.018	0.024	
c2	0.46	0.89	0.018	0.035	
D	5.97	6.22	0.235	0.245	5
D1	5.21	-	0.205	-	3
Е	6.35	6.73	0.250	0.265	5
E1	4.32	-	0.170	-	3

SYMBOL	MILLIN	IETERS	INCHES		NOTES
STWIBOL	MIN.	MAX.	MIN.	MAX.	NOTES
е	2.29	BSC	0.090	BSC	
Н	9.40	10.41	0.370	0.410	
L	1.40	1.78	0.055	0.070	
L1	2.74 BSC		0.108 REF.		
L2	0.51	BSC	0.020	BSC	
L3	0.89	1.27	0.035	0.050	3
L4	-	1.02	-	0.040	
L5	1.14	1.52	0.045	0.060	2
Ø	0°	10°	0°	10°	
Ø1	0°	15°	0°	15°	
Ø2	25°	35°	25°	35°	

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension uncontrolled in L5
- (3) Dimension D1, E1, L3 and b3 establish a minimum mounting surface for thermal pad
- (4) Section C C dimension apply to the flat section of the lead between 0.13 and 0.25 mm (0.005 and 0.10") from the lead tip
- (5) 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 outermost extremes of the plastic body
- (6) Dimension b1 and c1 applied to base metal only
- (7) Datum A and B to be determined at datum plane H
- (8) Outline conforms to JEDEC® outline TO-252AA



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