

Hyperfast Rectifier, 15 A FRED Pt®





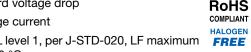
DPAK (TO-252AA)

PRIMARY CHARACTERISTICS						
I _{F(AV)}	15 A					
V_{R}	600 V					
V _F at I _F	1.5 V					
t _{rr} (typ.)	18 ns					
T _J max.	175 °C					
Package	DPAK (TO-252AA)					
Circuit configuration	Single					

FEATURES

- Hyperfast recovery time, extremely low Q_{rr}
- 175 °C maximum operating junction temperature
- For PFC CCM operation
- · Low forward voltage drop
- 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 www.vishay.com/doc?99912

DESCRIPTION / APPLICATIONS

State of the art hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, hyperfast recovery time, and soft recovery.

The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in PFC boost stage in the AC/DC section of SMPS inverters or as freewheeling diodes. Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

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 = 117 °C	15				
Non-repetitive peak surge current	I _{FSM}	T _J = 25 °C	120	Α			
Peak repetitive forward current	I _{FM}	T _C = 117 °C, f = 20 kHz, d = 50 %	30				
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	TEST CONDITIONS MIN.				
Breakdown voltage, blocking voltage	V _{BR} , V _R	Ι _R = 100 μΑ	600	-	-		
		I _F = 15 A	-	2.3	3.2	V	
Forward voltage	V _F	I _F = 15 A, T _J = 125 °C - 1.6		1.6	1.9		
		I _F = 15 A, T _J = 150 °C	-	1.5	1.8		
		$V_R = V_R$ rated	-	-	50		
Reverse leakage current	I_R	T _J = 125 °C, V _R = V _R rated	-	-	200	μΑ	
		T _J = 150 °C, V _R = V _R rated	-	-	300		
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	



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	-	18	22			
		$I_F = 1 \text{ A}, dI_F/dt = 50 \text{ A/}\mu\text{s}, V_R = 30 \text{ V}$		-	22	-	ns		
Reverse recovery time	t _{rr}	$I_F = 15 \text{ A}, dI_F/dt = 100 \text{ A/}\mu\text{s}, V_R = 30 \text{ V}$		-	17	32			
		T _J = 25 °C	I _F = 15 A dI _F /dt = 200 A/μs V _R = 390 V	-	22	-			
		T _J = 125 °C		-	38	-			
Dook roopyony gurrent	I _{RRM}	T _J = 25 °C		-	3.1	-	Α		
Peak recovery current		T _J = 125 °C		-	4.6	-	A		
Reverse recovery charge	0	T _J = 25 °C		-	37	-	nC		
	Q _{rr}	T _J = 125 °C		-	92	-	i iiC		

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 per leg	R _{thJC}		-	1.4	1.8	°C/W	
Thermal resistance, junction to ambient per leg	R _{thJA}		-	-	70	C/VV	
Approximate weight				0.3		g	
Approximate weight				0.01		OZ.	
Marking device		Case style DPAK (TO-252AA)	15EWX06FN				

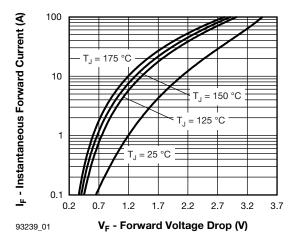


Fig. 1 - Typical Forward Voltage Drop Characteristics

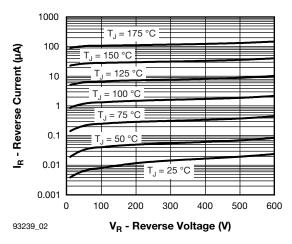


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

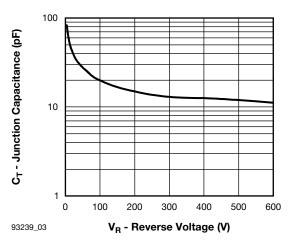


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

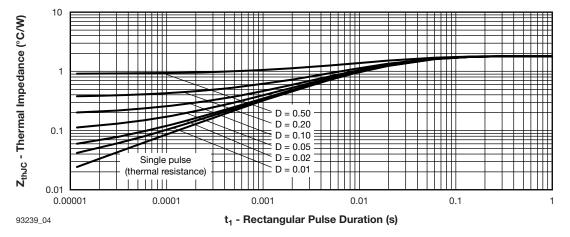


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

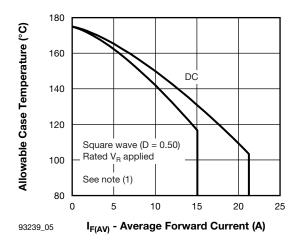


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current

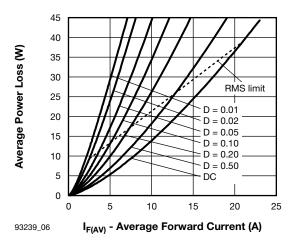


Fig. 6 - Forward Power Loss Characteristics

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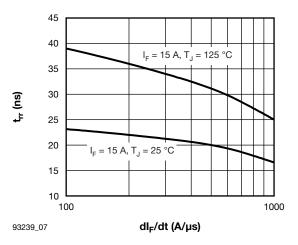


Fig. 7 - Typical Reverse Recovery Time vs. dl_F/dt

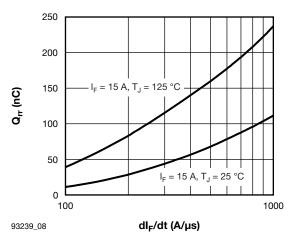
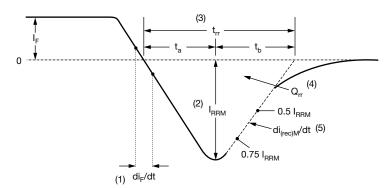


Fig. 8 - Typical Stored Charge vs. dl_E/dt

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. 6); Pd_{REV} = inverse power loss = V_{R1} x I_R (1 - D); I_R at V_{R1} = rated V_R



- (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 ${\rm I_{RRM}}$

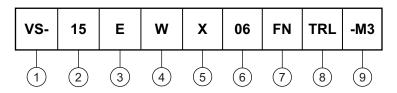
$$Q_{rr} = \frac{t_{rr} x I_{RRM}}{2}$$

(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)

Circuit configuration:

E = Single diode

Package identifier:

W = D-PAK

5 - X = hyperfast recovery time

6 - Voltage rating (06 = 600 V)

7 - FN = TO-252AA

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

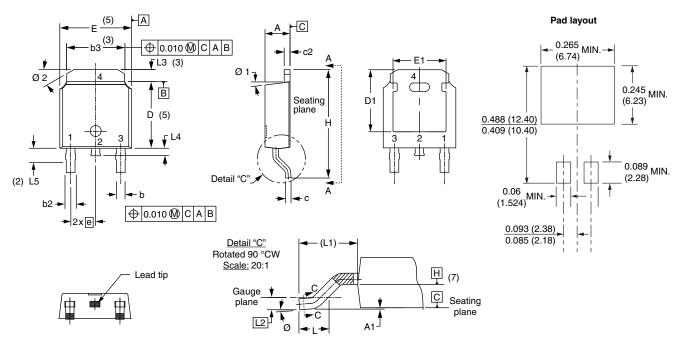
ORDERING INFORMATION (Example)						
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION				
VS-15EWX06FN-M3	75	Antistatic plastic tube				
VS-15EWX06FNTR-M3	2000	13" diameter reel				
VS-15EWX06FNTRL-M3	3000	13" diameter reel				
VS-15EWX06FNTRR-M3	3000	13" diameter reel				

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?96041					



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

DIMENSIONS in millimeters and inches



SYMBOL	MILLIN	IETERS	INCHES		NOTES	SY
STIMBOL	MIN.	MAX.	MIN.	MAX.	NOTES	31
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	MILLIMETERS		HES	NOTES
STMBOL	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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