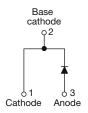


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Vishay Semiconductors

Hyperfast Rectifier, 8 A FRED Pt®





PRIMARY CHARACTERISTICS									
I _{F(AV)}	8 A								
V _R	600 V								
V _F at I _F	1.4 V								
t _{rr} (typ.)	15 ns								
T _J max.	175 °C								
Package	TO-220AC 2L								
Circuit configuration	Single								

FEATURES

- · Hyperfast recovery time
- Benchmark ultra low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current



- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

DESCRIPTION / APPLICATIONS

State of the art hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, hyperfast recover 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						
Repetitive peak reverse voltage	V_{RRM}		600	V						
Average rectified forward current	I _{F(AV)}	T _C = 143 °C	8							
Non-repetitive peak surge current	I _{FSM}	T _J = 25 °C	110	Α						
Repetitive peak forward current	I _{FM}		18							
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}	Ι _R = 100 μΑ	600	-	-	.,				
Forward voltage	V _F	I _F = 8 A	-	2.3	3.0	V				
Forward voitage		I _F = 8 A, T _J = 150 °C	-	1.4	1.7	•				
Doverno lookago ourrent	ı	$V_R = V_R$ rated	-	0.3	50					
Reverse leakage current	I _R	$T_J = 150 ^{\circ}\text{C}, V_R = V_R \text{rated}$	-	35	500	μA				
Junction capacitance C _T		V _R = 600 V	-	17	-	pF				
Series inductance	L _S	Measured lead to lead 5 mm from package body	-	8.0	-	nH				



DYNAMIC RECOVERY CHARACTERISTICS (T _C = 25 °C unless otherwise specified)									
PARAMETER	SYMBOL	TEST CO	NDITIONS	MIN.	TYP.	MAX.	UNITS		
		$I_F = 1 A, dI_F/dt = 100$	-	15	19				
Reverse recovery time		$I_F = 8 A, dI_F/dt = 100$	$I_F = 8 \text{ A}, dI_F/dt = 100 \text{ A/}\mu\text{s}, V_R = 30 \text{ V}$			24			
Reverse recovery time	t _{rr}	T _J = 25 °C		-	17	-	ns		
		T _J = 125 °C	1	=	40	-			
Peak recovery current		T _J = 25 °C	I _F = 8 A	-	2.3	-	- A - nC		
reak recovery current	IRRM	T _J = 125 °C	$dI_F/dt = 200 A/\mu s$ $V_B = 390 V$	-	4.5	-			
Devene receiver charac	0	T _J = 25 °C	- VR - 000 V	=	20	-			
Reverse recovery charge	Q _{rr}	T _J = 125 °C		-	100	-			
Reverse recovery time	t _{rr}		I _F = 8 A	-	31	-	ns		
Peak recovery current	I _{RRM}	T _J = 125 °C	$dI_F/dt = 600 A/\mu s$	-	12	-	Α		
Reverse recovery charge	Q _{rr}		-	195	-	nC			

THERMAL - MECHANICAL SPECIFICATIONS									
PARAMETER	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	2	°C/W			
Thermal resistance, junction-to-ambient per leg	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			
weight			1	0.07	-	oz.			
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)			
Marking device		Case style TO-220AC 2L		8ET	X06				

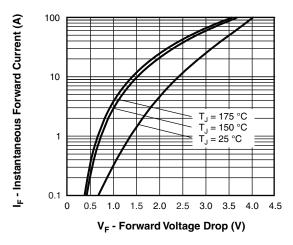


Fig. 1 - Typical Forward Voltage Drop Characteristics

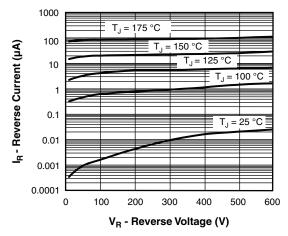


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

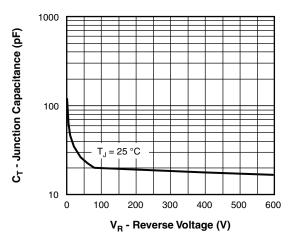


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

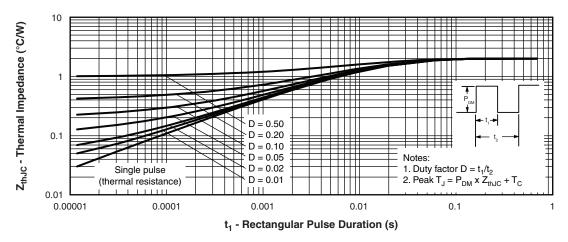


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

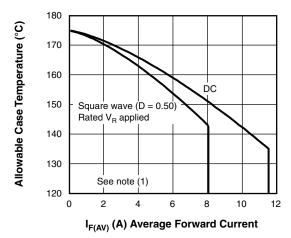


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current

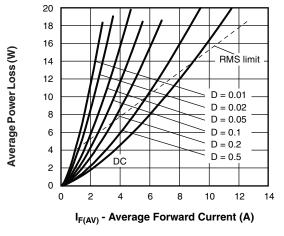


Fig. 6 - Forward Power Loss Characteristics

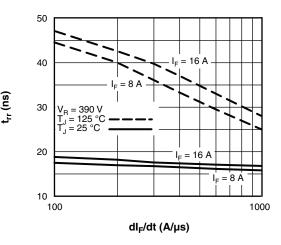
Note

 $[\]begin{array}{ll} \text{(1)} & \text{Formula used: } T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}; \\ Pd = \text{forward power loss} = I_{F(AV)} \times V_{FM} \text{ at } (I_{F(AV)}/D) \text{ (see fig. 5)}; \\ Pd_{REV} = \text{inverse power loss} = V_{R1} \times I_R \text{ (1 - D); } I_R \text{ at } V_{R1} = \text{rated } V_R \\ \end{array}$



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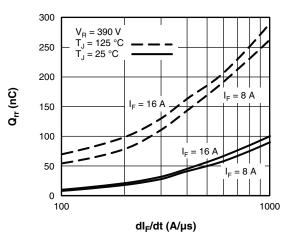
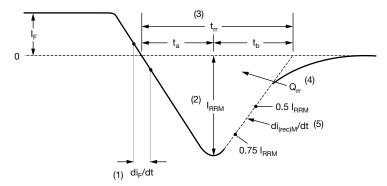


Fig. 8 - Typical Stored Charge vs. dl_E/dt



- (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 $\rm I_{r}$ to point where a line passing through 0.75 $\rm I_{RRM}$ and 0.50 $\rm I_{RRM}$ extrapolated to zero current.
- (4) \mathbf{Q}_{rr} area under curve defined by \mathbf{t}_{rr} and \mathbf{I}_{RRM}

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

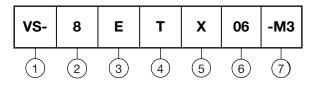
(5) di_{(rec)M}/dt - peak rate of change of current during t_b portion of t_{rr}

Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

2 - Current rating (8 = 8 A)

3 - E = single

- T = TO-220, D²PAK (TO-263AB)

5 - X = hyperfast rectifier

Voltage rating (06 = 600 V)

7 - Environmental digit:

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

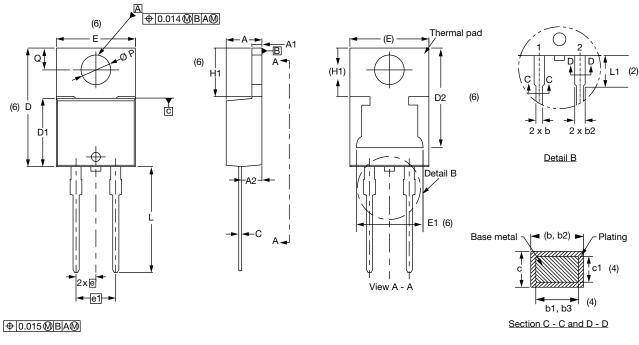
ORDERING INFORMATION (Example)									
PREFERRED P/N BASE QUANTITY PACKAGING DESCRIPTION									
VS-8ETX06-M3	50	Antistatic plastic tubes							

LINKS TO RELATED DOCUMENTS								
Dimensions <u>www.vishay.com/doc?96156</u>								
Part marking information	www.vishay.com/doc?95391							



TO-220AC 2L

DIMENSIONS in millimeters and inches



Lead tip

Conforms to JEDEC® outline TO-220AC

SYMBOL	MILLIN	IETERS	INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES	
	MIN.	MAX.	MIN.	MAX.	NOTES	NOTES	STWIBOL	MIN.	MAX.	MIN.	MAX.	NOTES
Α	4.25	4.65	0.167	0.183			D2	11.68	13.30	0.460	0.524	6, 7
A1	1.14	1.40	0.045	0.055			E	10.11	10.51	0.398	0.414	3, 6
A2	2.50	2.92	0.098	0.115			E1	6.86	8.89	0.270	0.350	6
b	0.69	1.01	0.027	0.040			е	2.41	2.67	0.095	0.105	
b1	0.38	0.97	0.015	0.038	4		e1	4.88	5.28	0.192	0.208	
b2	1.20	1.73	0.047	0.068			H1	6.09	6.48	0.240	0.255	6
b3	1.14	1.73	0.045	0.068	4		L	13.52	14.02	0.532	0.552	
С	0.36	0.61	0.014	0.024			L1	3.32	3.82	0.131	0.150	2
c1	0.36	0.56	0.014	0.022	4		ØΡ	3.54	3.91	0.139	0.154	
D	14.85	15.35	0.585	0.604	3		Q	2.60	3.00	0.102	0.118	
D1	8.38	9.02	0.330	0.355							•	

Notes

- $^{(1)}$ Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1, 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
- (4) Dimension b1, b3, and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2, and E1
- (7) Outline conforms to JEDEC® TO-220, except D2

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