

ROHS

HALOGEN FREE

# Hyperfast Rectifier, 75 A FRED Pt® G5



### **LINKS TO ADDITIONAL RESOURCES**

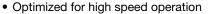




PRIMARY CHARACTERISTICS						
I <sub>F(AV)</sub>	75 A					
V <sub>R</sub>	600 V					
V <sub>F</sub> at I <sub>F</sub> at 125 °C	1.4 V					
t <sub>rr</sub> (typ.)	29					
I <sub>FSM</sub>	565					
T <sub>J</sub> max.	175 °C					
Package	TO-247AD 2L					
Circuit configuration	Single					

#### **FEATURES**

- Hyperfast and optimized Q<sub>rr</sub>
- Best in class forward voltage drop and switching losses trade off





- Polyimide passivation
- AEC-Q101 qualified meets JESD 201 class 2 whisker test
- Material categorization: for definitions of compliance please see <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

#### **DESCRIPTION / APPLICATIONS**

Featuring a unique combination of low conduction and switching losses, this rectifier is the right choice for soft switched and resonant converters, as well as medium frequency hard switching converters. This device is specifically designed to improve efficiency of high speed LLC output rectification stages of EV / HEV on-board battery chargers

### **MECHANICAL DATA**

Case: TO-247AD 2L

Molding compound meets UL 94 V-0 flammability rating **Terminal:** matte tin plated leads, solderable per J-STD-002

ABSOLUTE MAXIMUM RATINGS								
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS				
Repetitive peak reverse voltage	V <sub>RRM</sub>		600	V				
Average rectified forward current	I <sub>F(AV)</sub>	T <sub>C</sub> = 103 °C, D = 0.50	75					
Non-repetitive peak surge current	I <sub>FSM</sub>	$T_C = 25$ °C, $t_p = 10$ ms, sine wave	565	Α				
Repetitive peak forward current	I <sub>FRM</sub>	T <sub>C</sub> = 103 °C, D = 0.50, f = 20 kHz	150					
Operating junction and storage temperature	T <sub>J</sub> , T <sub>Stq</sub>		-55 to +175	°C				

<b>ELECTRICAL SPECIFICATIONS</b> (T <sub>J</sub> = 25 °C unless otherwise specified)								
PARAMETER	SYMBOL TEST CONDITIONS			TYP.	MAX.	UNITS		
Breakdown voltage, blocking voltage	$V_{BR}$ , $V_{R}$	$I_R = 100 \mu A$	600	-	-			
Forward voltage	V <sub>F</sub>	I <sub>F</sub> = 75 A	-	1.6	2.2	V		
		I <sub>F</sub> = 75 A, T <sub>J</sub> = 125 °C	-	1.4	-			
Reverse leakage current	I <sub>R</sub>	$V_R = V_R$ rated	-	-	25			
neverse leakage current		T <sub>J</sub> = 125 °C, V <sub>R</sub> = V <sub>R</sub> rated	-	-	500	μΑ		
Junction capacitance	C <sub>T</sub>	V <sub>R</sub> = 200 V	-	96	-	pF		
Series inductance	Ls	Measured to lead 5 mm from package body	-	8	-	nH		



<b>DYNAMIC RECOVERY CHARACTERISTICS</b> (T <sub>J</sub> = 25 °C unless otherwise specified)								
PARAMETER	SYMBOL	TEST CO	NDITIONS	MIN.	TYP.	MAX.	UNITS	
		$I_F = 1.0 \text{ A}, dI_F/dt = 100$	) A/μs, V <sub>R</sub> = 30 V	-	29	-		
Reverse recovery time	t <sub>rr</sub>	T <sub>J</sub> = 25 °C		-	44	-	ns	
		T <sub>J</sub> = 125 °C		-	69	-		
Dook roopyony gurrent		T <sub>J</sub> = 25 °C	$I_F = 50 \text{ A}$	-	18	-	А	
Peak recovery current	I <sub>RRM</sub>	T <sub>J</sub> = 125 °C	$dI_F/dt = 1000 \text{ A/}\mu\text{s}$ $V_R = 400 \text{ V}$	-	42	-		
Dougrap recovery charge	0	T <sub>J</sub> = 25 °C		-	484	-	nC	
Reverse recovery charge	Q <sub>rr</sub>	T <sub>J</sub> = 125 °C		-	1731	-	110	
Poverse receivery time		T <sub>J</sub> = 25 °C		-	48	-		
Reverse recovery time	t <sub>rr</sub>	T <sub>J</sub> = 125 °C		-	75	-	ns	
Dools week your assument		T <sub>J</sub> = 25 °C	I <sub>F</sub> = 75 A dI <sub>F</sub> /dt = 1000 A/μs V <sub>B</sub> = 400 V	-	21	-	^	
Peak recovery current	I <sub>RRM</sub>	T <sub>J</sub> = 125 °C		-	46	-	Α	
Reverse recovery charge		T <sub>J</sub> = 25 °C	] ''	-	573	-	nC	
	Q <sub>rr</sub>	T <sub>J</sub> = 125 °C		-	2048	-	I IIC	

THERMAL - MECHANICAL SPECIFICATIONS								
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS		
Thermal resistance, junction-to-case	$R_{thJC}$		-	-	0.5	°C/W		
Weight			-	5.5	-	g		
Mounting torque			6 (5)	-	12 (10)	kgf · cm (lbf · in)		
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-55	-	175	°C		
Marking device		Case style: TO-247AD 2L	E5PX7506LH					

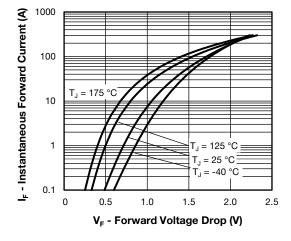


Fig. 1 - Forward Voltage Drop Characteristics

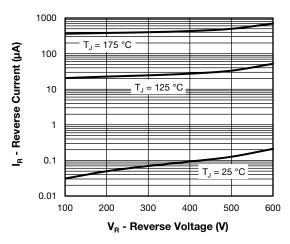


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

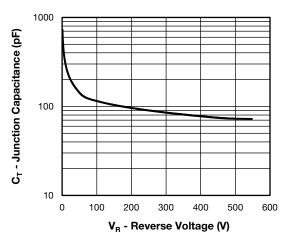


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

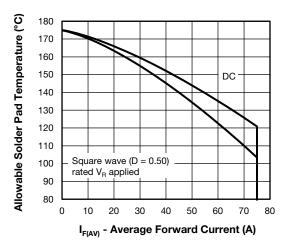


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

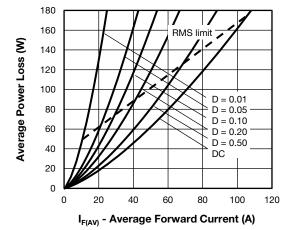


Fig. 5 - Forward Power Loss Characteristics

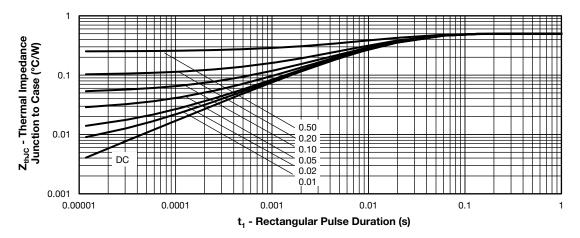


Fig. 6 - Transient Thermal Impedance, Junction to Case



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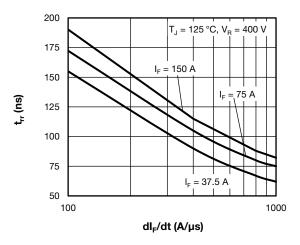


Fig. 7 - Typical Reverse Recovery Time vs. dl<sub>F</sub>/dt

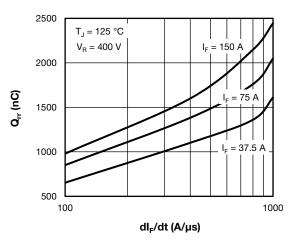


Fig. 8 - Typical Reverse Recovery Charge vs. dl<sub>F</sub>/dt

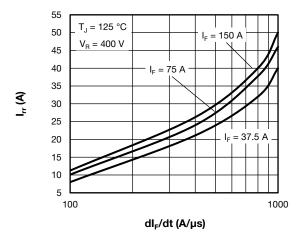


Fig. 9 - Typical Reverse Recovery Current vs. dl<sub>F</sub>/dt

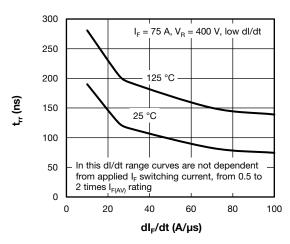


Fig. 10 - Typical Reverse Recovery Time vs. dl<sub>F</sub>/dt

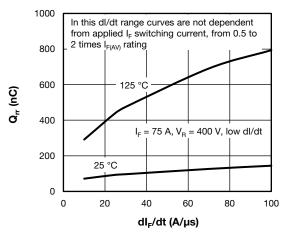


Fig. 11 - Typical Reverse Recovery Charge vs. dl<sub>F</sub>/dt

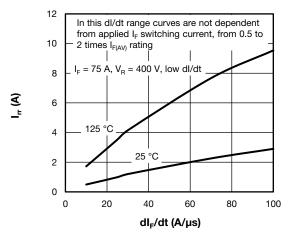


Fig. 12 - Typical Reverse Recovery Current vs. dl<sub>F</sub>/dt



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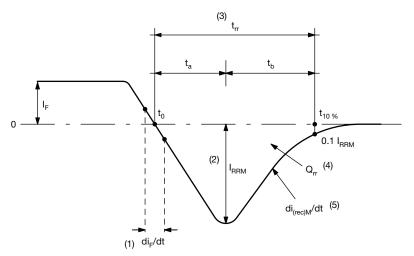


Fig. 13 - Reverse Recovery Waveform and Definitions

#### Notes

- (1) di<sub>F</sub>/dt rate of change of current through zero crossing
- (2) I<sub>RRM</sub> peak reverse recovery current
- (3)  $t_{rr}$  reverse recovery time measured from  $t_0$ , crossing point of negative going  $I_F$ , to point  $t_{10\%}$ , 0.1  $I_{RRM}$
- $^{(4)}~Q_{rr}$  area under curve defined by  $t_0$  and  $t_{10~\%}$

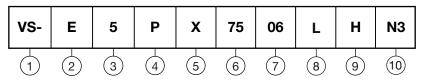
$$Q_{rr} = \int_{t_0}^{t_{10}\%} I(t)dt$$

 $^{(5)}$  di<sub>(rec)</sub>M/dt - peak rate of change of current during  $t_b$  portion of  $t_{rr}$ 



### **ORDERING INFORMATION TABLE**

	-= -	e.	_	



Vishay Semiconductors product

Circuit configuration
E = single diode

FRED Pt® Gen 5

P = TO-247 package

5 - Process type:

X = hyperfast recovery

6 - Current rating (75 = 75 A)

7 - Voltage rating (06 = 600 V)

8 - Package: L = long lead (TO-247AD)

9 - H = AEC-Q101 qualified - Environmental digit:

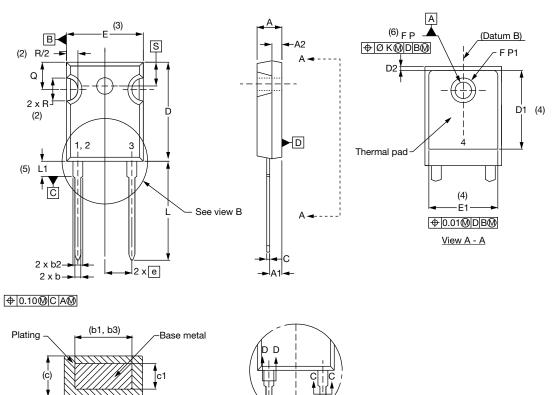
N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)							
PREFERRED P/N QUANTITY PER TUBE MINIMUM ORDER QUANTITY PACKAGING DESCRIPTION							
VS-E5PX7506LHN3	25	500	Antistatic plastic tube				

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95536
Part marking information	www.vishay.com/doc?95648

### **TO-247AD 2L**

### **DIMENSIONS** in millimeters and inches



View B

SYMBOL	MILLIN	MILLIMETERS		HES	NOTES
SYMBOL	MIN.	MAX.	MIN.	MAX.	NOTES
А	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
b	0.99	1.40	0.039	0.055	
b1	0.99	1.35	0.039	0.053	
b2	1.65	2.39	0.065	0.094	
b3	1.65	2.34	0.065	0.092	
С	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4
D2	0.51	1.35	0.020	0.053	

Section C - C, D - D

SYMBOL	MILLIN	IETERS	INC	HES	NOTES
STWIBOL	MIN.	MAX.	MIN.	MAX.	NOTES
Е	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
е	5.46	BSC	0.215	BSC	
ØK	0.2	0.254		10	
L	19.81	20.32	0.780	0.800	
L1	3.71	4.29	0.146	0.169	
ØΡ	3.56	3.66	0.14	0.144	
Ø P1	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178	0.216	
S	5.51 BSC		0.217	BSC	
	•		•	•	

#### **Notes**

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body
- (4) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension A min., D, E min., Q min., S, and note 4



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