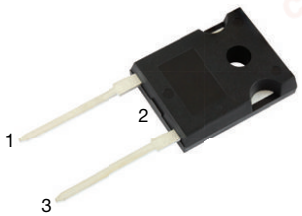
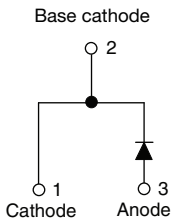
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Hyperfast Rectifier, 60 A FRED Pt® G5



TO-247AD 2L



FEATURES

- Hyperfast and optimized Q_{rr}
- Best in class forward voltage drop and switching losses trade off
- Optimized for high speed operation
- 175 °C maximum operating junction temperature
- Polyimide passivation
- AEC-Q101 qualified, meets JESD 201 class 1A whisker test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

HALOGEN FREE

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	60 A
V_R	600 V
V_F at I_F at 125 °C	1.2 V
t_{rr} (typ.)	29 ns
I_{FSM}	500 A
T_J max.	175 °C
Package	TO-247AD 2L
Circuit configuration	Single

LINKS TO ADDITIONAL RESOURCES

3D Models

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_{RRM}		600	V
Average rectified forward current	$I_{F(AV)}$	T_C = 110 °C, D = 0.50	60	A
Non-repetitive peak surge current	I_{FSM}	T_C = 25 °C, t_p = 10 ms, sine wave	500	
Repetitive peak forward current	I_{FRM}	T_C = 110 °C, D = 0.50, f = 20 kHz	120	
Operating junction and storage temperature	T_J, T_{Stg}		-55 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	-	-	V
Forward voltage	V_F	I_F = 60 A	-	1.4	1.7	
		I_F = 60 A, T_J = 125 °C	-	1.2	-	
Reverse leakage current	I_R	V_R = V_R rated	-	-	25	µA
		T_J = 125 °C, V_R = V_R rated	-	-	500	
Junction capacitance	C_T	V_R = 200 V	-	65	-	pF
Series inductance	L_S	Measured 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 CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	I_F = 1 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	29	-	ns
		T_J = 25 °C	I_F = 40 A dI_F/dt = 1000 A/µs V_R = 400 V	-	49	-	
		T_J = 125 °C		-	74	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	21	-	A
		T_J = 125 °C		-	43	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	640	-	nC
		T_J = 125 °C		-	1979	-	
Reverse recovery time	t_{rr}	T_J = 25 °C	I_F = 60 A dI_F/dt = 1000 A/µs V_R = 400 V	-	54	-	ns
		T_J = 125 °C		-	82	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	22	-	A
		T_J = 125 °C		-	47	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	790	-	nC
		T_J = 125 °C		-	2385	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction-to-case	R_{thJC}		-	-	0.63	°C/W
Weight			-	5.5	-	g
			-	0.2	-	oz.
Mounting torque			1.2 (5.0)	-	24 (10)	kgf · cm (lbf · in)
Maximum junction and storage temperature range	T_J, T_{Stg}		-55	-	175	°C
Marking device		Case style TO-247AD 2L	E5PH6006LH			

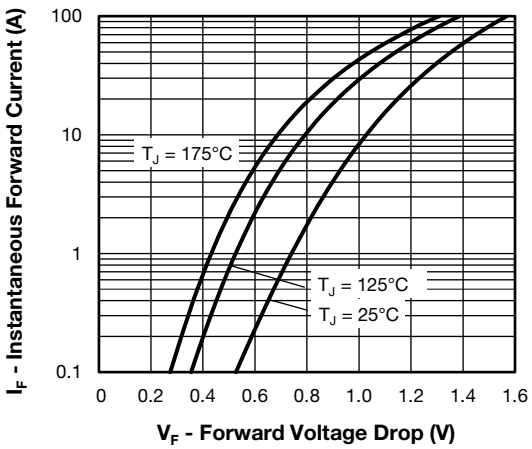


Fig. 1 - Typical Forward Voltage Drop Characteristics

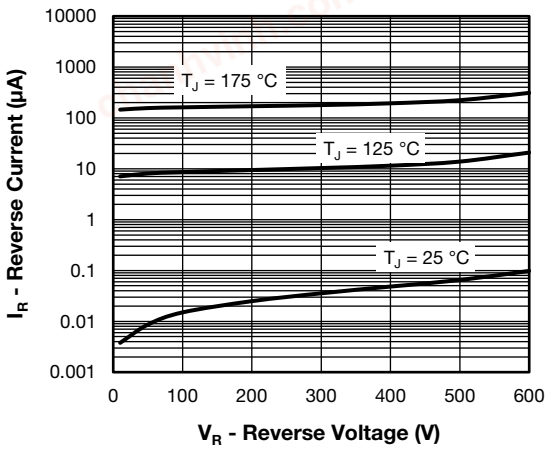


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

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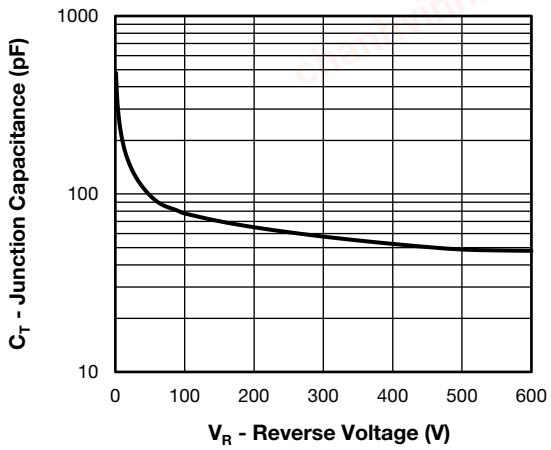


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

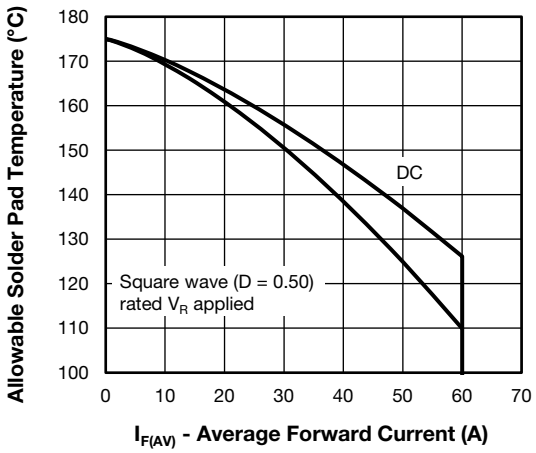


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

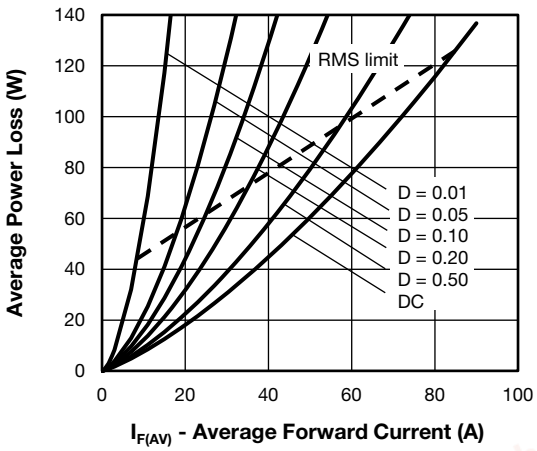


Fig. 5 - Average Power Loss vs. Average Forward Current

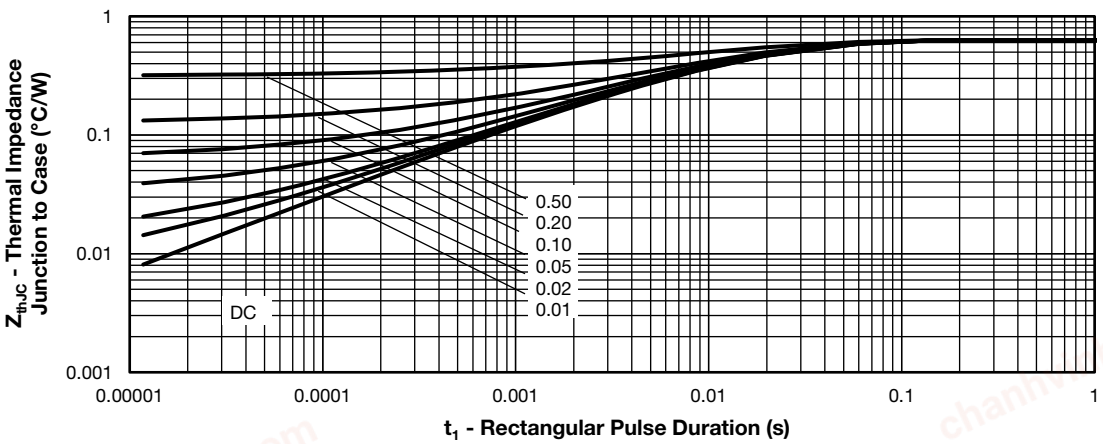


Fig. 6 - Thermal Impedance Z_{thJC} Characteristics

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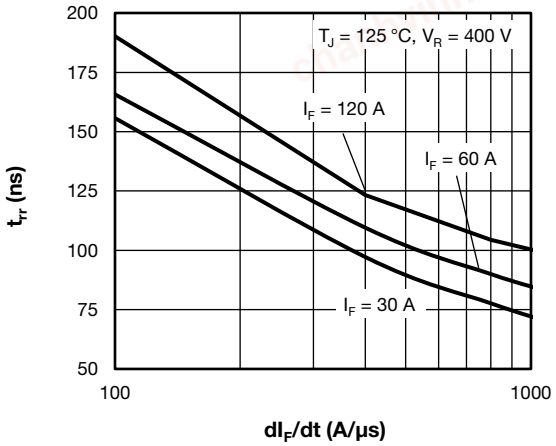


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

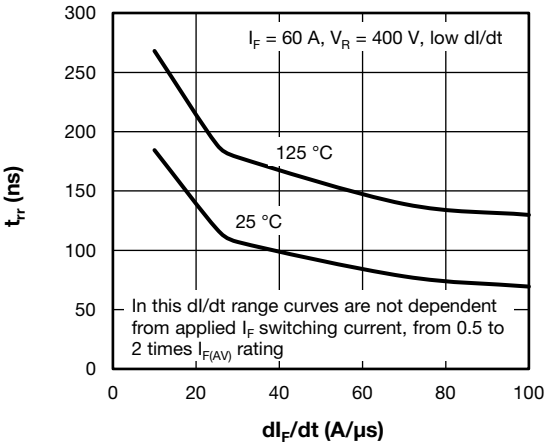


Fig. 10 - Typical Reverse Recovery Time vs. dI_F/dt

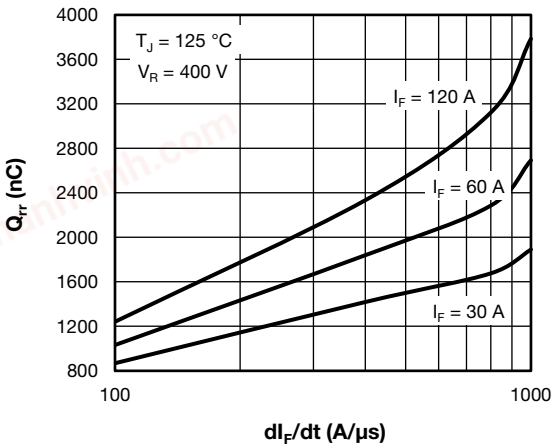


Fig. 8 - Typical Reverse Recovery Charge vs. dI_F/dt

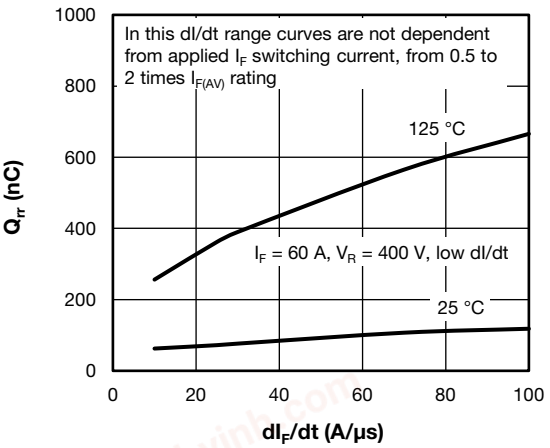


Fig. 11 - Typical Reverse Recovery Charge vs. dI_F/dt

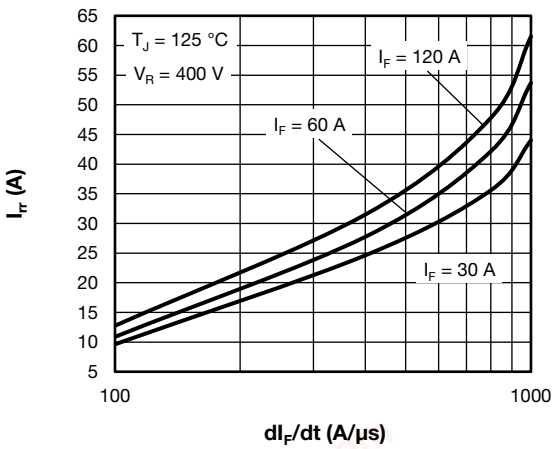


Fig. 9 - Typical Reverse Recovery Current vs. dI_F/dt

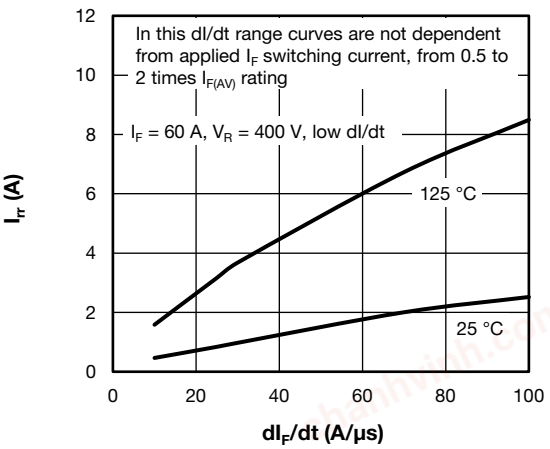


Fig. 12 - Typical Reverse Recovery Current vs. dI_F/dt

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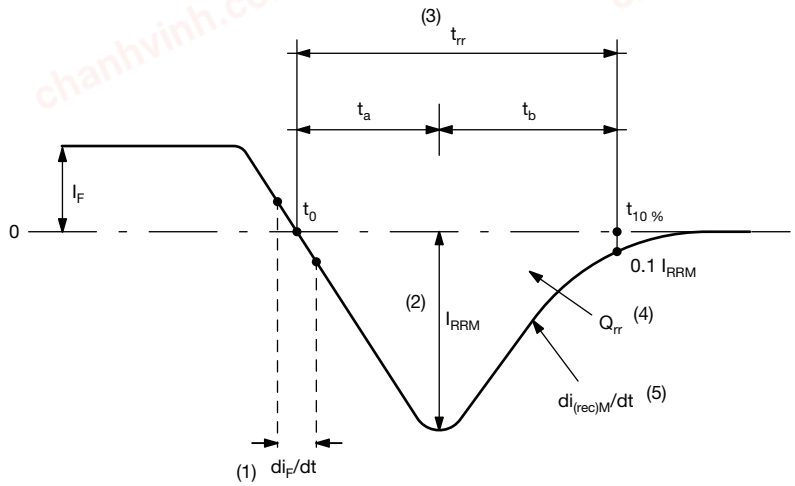


Fig. 13 - Reverse Recovery Waveform and Definitions

Notes

(1) di_F/dt - rate of change of current through zero crossing

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

ORDERING INFORMATION TABLE

Device code	VS-	E	5	P	H	60	06	L	H	N3
	1	2	3	4	5	6	7	8	9	10

1	-	Vishay Semiconductors product
2	-	Circuit configuration E = single diode
3	-	FRED Pt® Gen 5
4	-	P = TO-247 package
5	-	Process type: H = hyperfast recovery
6	-	Current rating 60 = 60 A)
7	-	Voltage rating (06 = 600 V)
8	-	Package: L = long lead (TO-247AD)
9	-	H = AEC-Q101 qualified
10	-	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-E5PH6006LHN3	25	500	Antistatic plastic tube

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

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