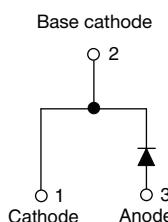


Hyperfast Rectifier, 15 A FRED Pt® G5



LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	15 A
V_R	1200 V
V_F at I_F at 125 °C	1.7 V
t_{rr}	37 ns
T_J max.	175 °C
Package	TO-220AC 2L
Circuit configuration	Single

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
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

DESCRIPTION / APPLICATIONS

Featuring a unique combination of low conduction and switching losses, this rectifier is the right choice for high frequency converters, both soft switched / resonant.

Specifically designed to improve efficiency of PFC and output rectification stages of EV / HEV battery charging stations, booster stage of solar inverters and UPS applications, these devices are perfectly matched to operate with MOSFETs or high speed IGBTs.

MECHANICAL DATA

Case: TO-220AC 2L

Molding compound meets UL 94 V-0 flammability rating

Terminals: matte tin plated leads, solderable per J-STD-002

Polarity: as per marking device details

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Repetitive peak reverse voltage	V_{RRM}			1200	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 110$ °C, $D = 0.50$	15	A	
Repetitive peak forward current	I_{FRM}	$T_C = 110$ °C, $D = 0.50$, $f = 20$ kHz	30		
Non-repetitive peak surge current	I_{FSM}	$T_C = 45$ °C, $t_p = 10$ ms, sine wave	125		
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	1200	-	-	V
Forward voltage	V_F	$I_F = 15$ A	-	1.9	2.5	
		$I_F = 15$ A, $T_J = 125$ °C	-	1.7	-	
Reverse leakage current	I_R	$V_R = V_R$ rated	-	-	50	µA
		$T_J = 125$ °C, $V_R = V_R$ rated	-	-	500	
Junction capacitance	C_T	$V_R = 200$ V	-	10	-	pF
Series inductance	L_S	Measured to lead 5 mm from package body	-	8	-	nH

DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	$I_F = 1.0 \text{ A}$, $dI_F/dt = 100 \text{ A}/\mu\text{s}$, $V_R = 30 \text{ V}$		-	37	50	ns
		$T_J = 25^\circ\text{C}$		-	95	-	
		$T_J = 125^\circ\text{C}$		-	146	-	
Peak recovery current	I_{RRM}	$T_J = 25^\circ\text{C}$	$I_F = 10 \text{ A}$, $dI_F/dt = 600 \text{ A}/\mu\text{s}$, $V_R = 400 \text{ V}$	-	14	-	A
		$T_J = 125^\circ\text{C}$		-	19	-	
Reverse recovery charge	Q_{rr}	$T_J = 25^\circ\text{C}$		-	545	-	nC
		$T_J = 125^\circ\text{C}$		-	1200	-	
Reverse recovery time	t_{rr}	$T_J = 25^\circ\text{C}$	$I_F = 15 \text{ A}$, $dI_F/dt = 1000 \text{ A}/\mu\text{s}$, $V_R = 800 \text{ V}$	-	75.5	-	ns
		$T_J = 125^\circ\text{C}$		-	100	-	
Peak recovery current	I_{RRM}	$T_J = 25^\circ\text{C}$		-	23	-	A
		$T_J = 125^\circ\text{C}$		-	35	-	
Reverse recovery charge	Q_{rr}	$T_J = 25^\circ\text{C}$		-	935	-	nC
		$T_J = 125^\circ\text{C}$		-	1985	-	

THERMAL - MECHANICAL SPECIFICATIONS							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction-to-case	R_{thJC}			-	-	1.7	$^\circ\text{C}/\text{W}$
Weight				-	2.0	-	g
Mounting torque				6.0 (5.0)	-	12 (10)	$\text{kgf} \cdot \text{cm}$ ($\text{lbf} \cdot \text{in}$)
Maximum junction and storage temperature range	T_J, T_{Stg}			-55	-	175	$^\circ\text{C}$
Marking device		Case style TO-220AC 2L		E5TH1512			

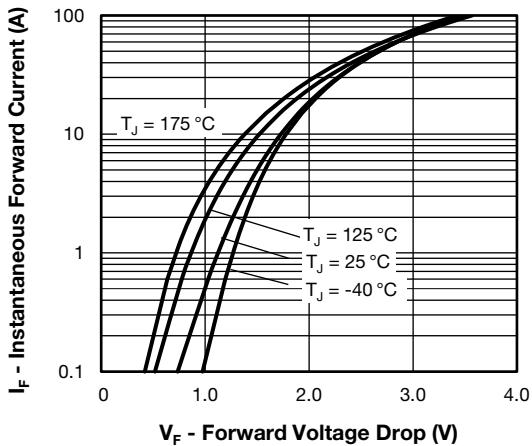


Fig. 1 - Forward Voltage Drop Characteristics

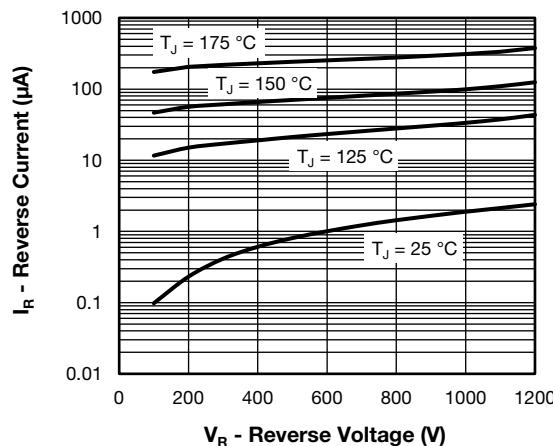


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

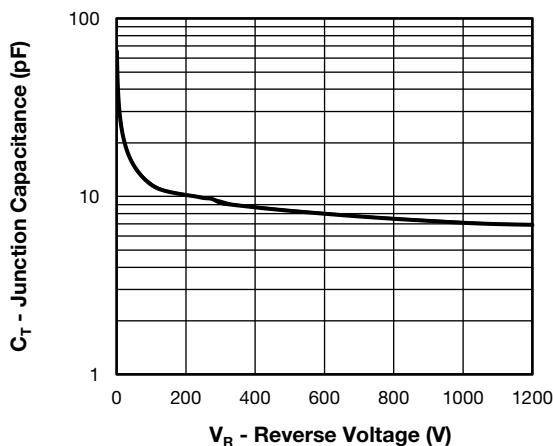


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

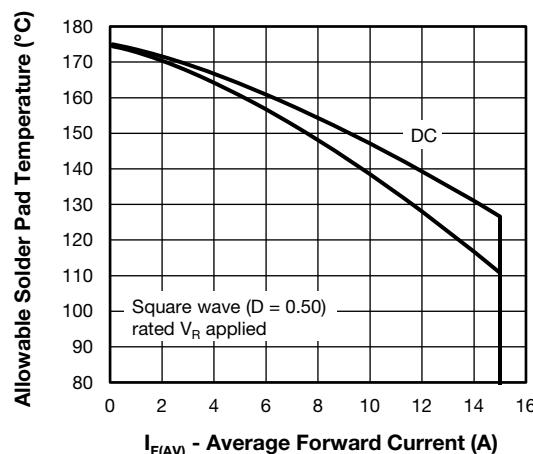


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

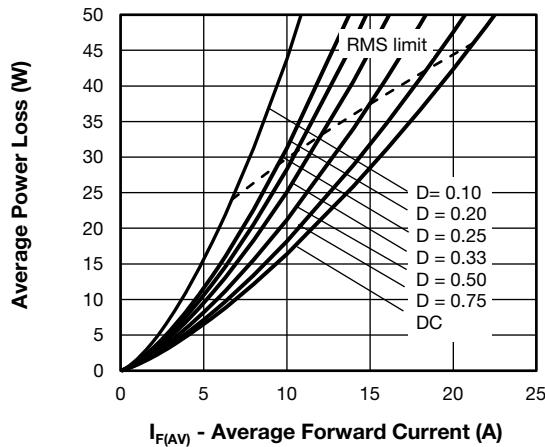


Fig. 5 - Forward Power Loss Characteristics

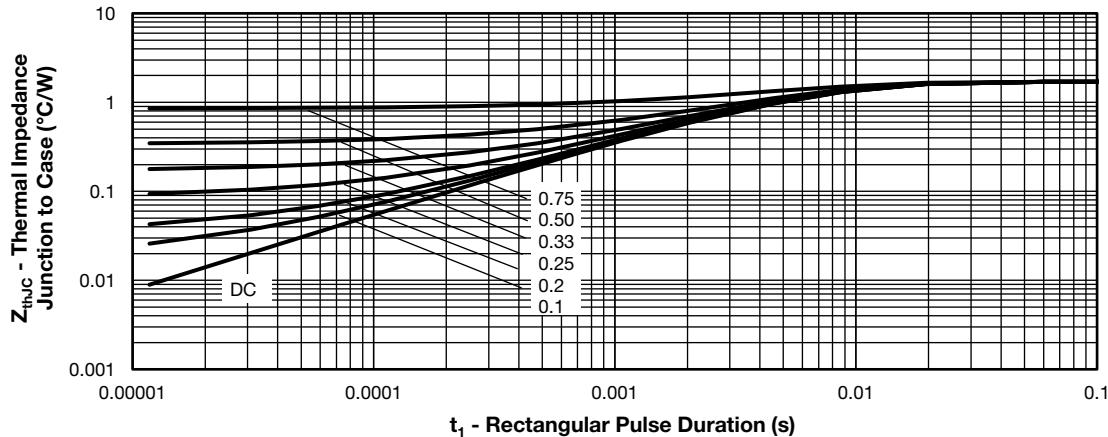


Fig. 6 - Transient Thermal Impedance, Junction to Case

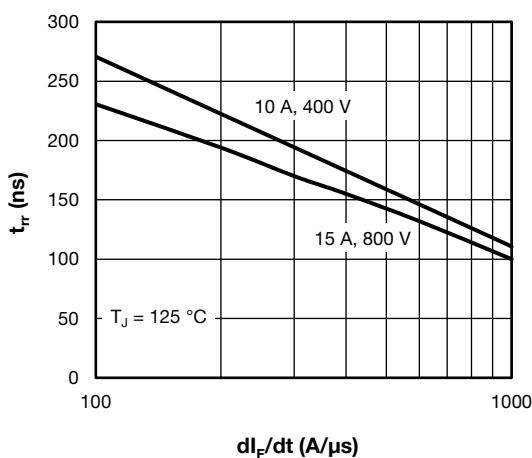


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

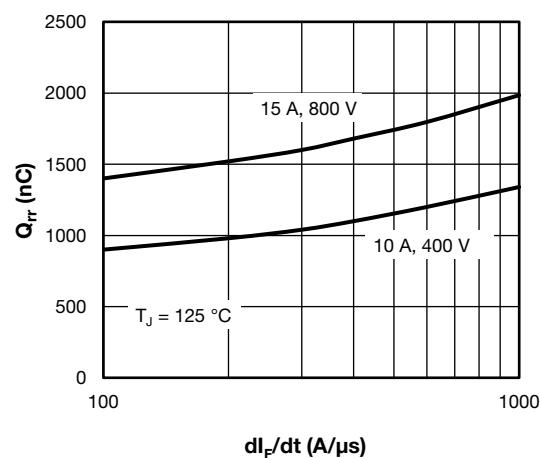


Fig. 8 - Typical Stored Charge vs. dI_F/dt

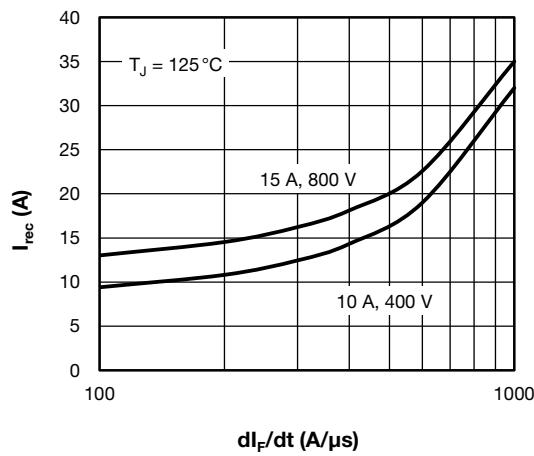


Fig. 9 - Typical Stored Charge vs. dI_F/dt

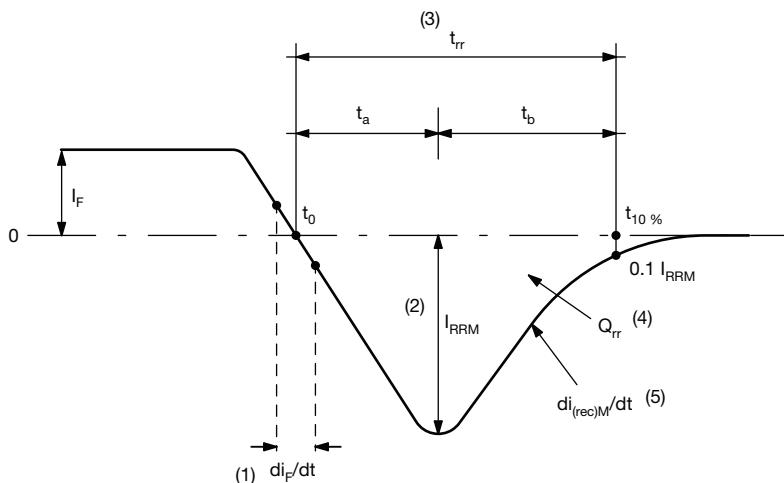


Fig. 10 - Reverse Recovery Waveform and Definitions

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	T	H	15	12	-M3
	1	2	3	4	5	6	7	8

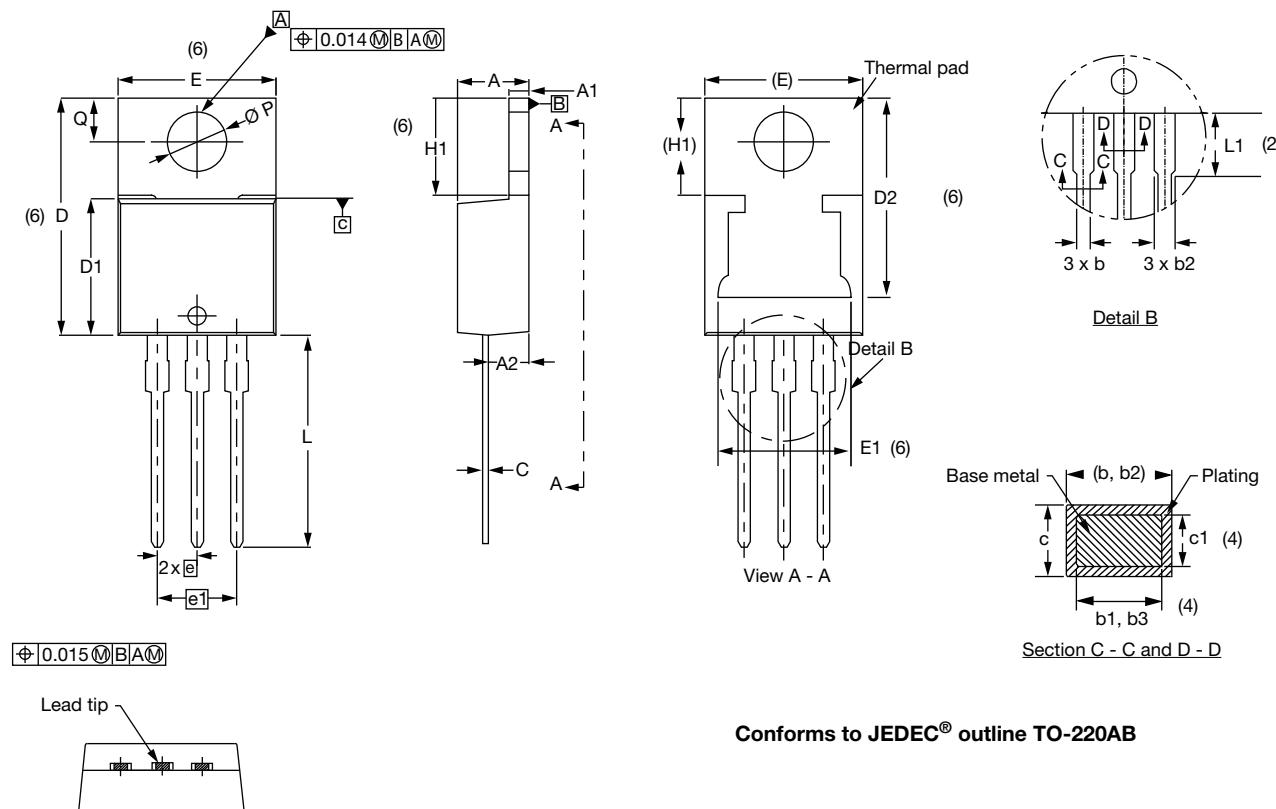
- 1** - Vishay Semiconductors product
- 2** - E = single diode
- 3** - 5 = FRED generation 5
- 4** - Package:
T = TO-220AC 2L
- 5** - H = hyperfast recovery
- 6** - Current rating (15 = 15 A)
- 7** - Voltage rating (12 = 1200 V)
- 8** - Environmental digit:
-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

ORDERING INFORMATION (Example)		
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-E5TH1512-M3	50	Antistatic plastic tubes

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

TO-220AB 3L

DIMENSIONS in millimeters and inches



Conforms to JEDEC® outline TO-220AB

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.50	2.92	0.098	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.85	15.35	0.585	0.604	3
D1	8.38	9.02	0.330	0.355	

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	11.68	13.30	0.460	0.524	6, 7
E	10.11	10.51	0.398	0.414	3, 6
E1	6.86	8.89	0.270	0.350	6
e	2.41	2.67	0.095	0.105	
e1	4.88	5.28	0.192	0.208	
H1	6.09	6.48	0.240	0.255	6
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
ØP	3.54	3.91	0.139	0.154	
Q	2.60	3.00	0.102	0.118	

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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