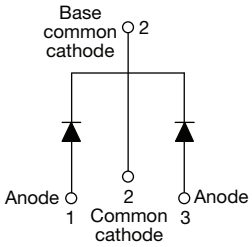
Hyperfast Rectifier, 2 x 15 A FRED Pt® G5

3L TO-220AB



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

LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$, per leg	15 A
V_R, per leg	1200 V
V_F at I_F at 125 °C, per leg	2.1 V
t_{rr}	29 ns
T_J max.	175 °C
Package	3L TO-220AB
Circuit configuration	Common cathode

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: 3L TO-220AB
Molding compound meets UL 94 V-0 flammability rating

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

Polarity: as per marking device details

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Repetitive peak reverse voltage, per leg	V_{RRM}		1200	V
Average rectified forward current, per leg	$I_{F(AV)}$	T_C = 98 °C, D = 0.50	15	A
Repetitive forward current, per leg	I_{FRM}	T_C = 98 °C, D = 0.50, 20 kHz	30	
Non-repetitive peak surge current, per leg	I_{FSM}	T_C = 45 °C, t_p = 10 ms, sine wave	110	
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, per leg	V_{BR}, V_R	I_R = 100 µA	1200	-	-	V
Forward voltage, per leg	V_F	I_F = 15 A	-	2.5	3.3	
		I_F = 15 A, T_J = 125 °C	-	2.1	-	
Reverse leakage current, per leg	I_R	V_R = V_R rated	-	-	50	µA
		T_J = 125 °C, V_R = V_R rated	-	-	500	
Junction capacitance, per leg	C_T	V_R = 200 V	-	10	-	pF
Series inductance, per leg	L_S	Measured to lead 5 mm from package body	-	8	-	nH

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time, per leg	t_{rr}	I_F = 1.0 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	29	44	ns
		T_J = 25 °C	I_F = 10 A dI_F/dt = 600 A/µs V_R = 400 V	-	96	-	
		T_J = 125 °C		-	137	-	
Peak recovery current, per leg	I_{RRM}	T_J = 25 °C		-	11.5	-	A
		T_J = 125 °C		-	16	-	
Reverse recovery charge, per leg	Q_{rr}	T_J = 25 °C		-	375	-	nC
		T_J = 125 °C		-	900	-	
Reverse recovery time, per leg	t_{rr}	T_J = 25 °C	I_F = 15 A dI_F/dt = 1000 A/µs V_R = 800 V	-	77.5	-	ns
		T_J = 125 °C		-	106	-	
Peak recovery current, per leg	I_{RRM}	T_J = 25 °C		-	21	-	A
		T_J = 125 °C		-	29	-	
Reverse recovery charge, per leg	Q_{rr}	T_J = 25 °C		-	680	-	nC
		T_J = 125 °C		-	1600	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Thermal resistance, junction-to-case, per leg	R_{thJC}		-	-	1.7	°C/W
Weight			-	2.0	-	g
			-	0.07	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Maximum junction and storage temperature range	T_J, T_{Stg}		-55	-	175	°C
Marking device		Case style 3L TO-220AB	C5TX3012			

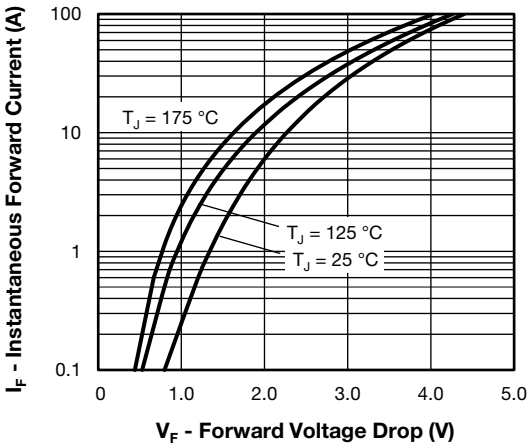


Fig. 1 - Forward Voltage Drop Characteristics, Per Leg

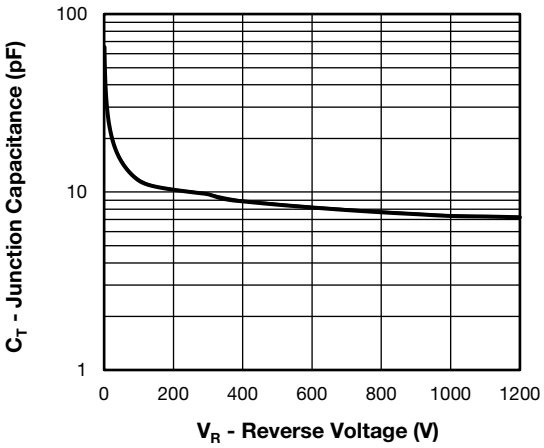


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, Per Leg

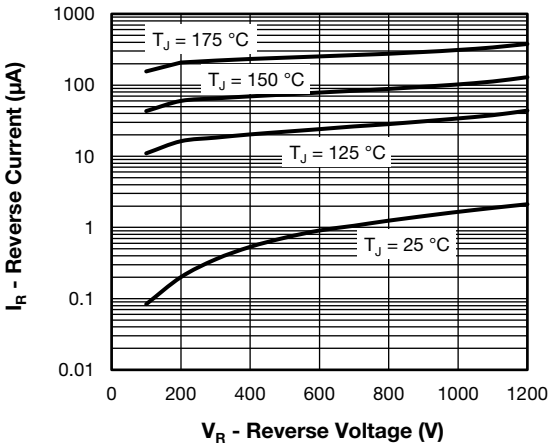


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage, Per Leg

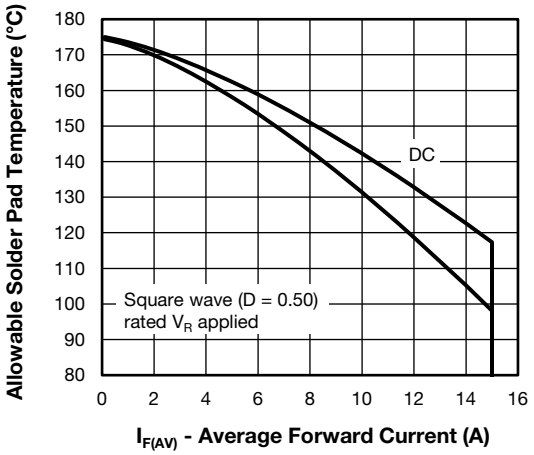


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current, Per Leg

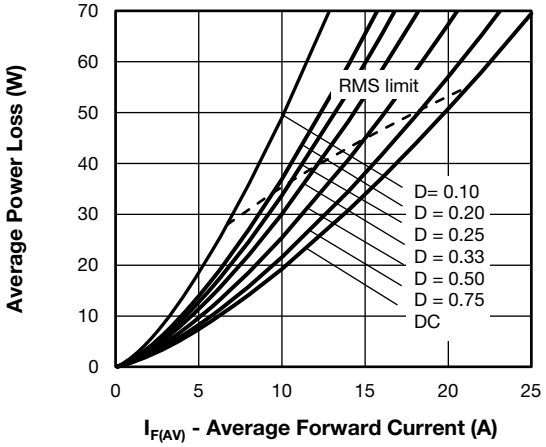


Fig. 5 - Forward Power Loss Characteristics, Per Leg

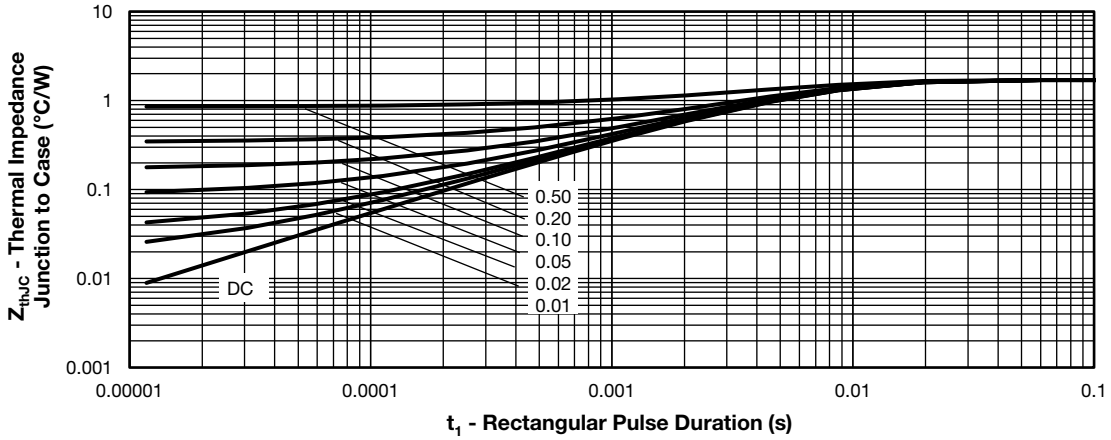


Fig. 6 - Transient Thermal Impedance, Junction to Case, Per Leg

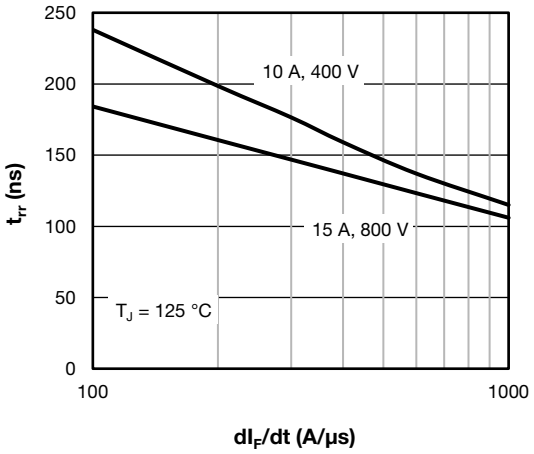


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt, Per Leg

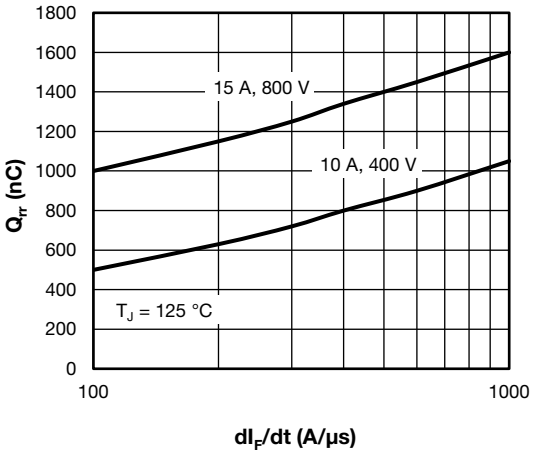


Fig. 8 - Typical Stored Charge vs. dI_F/dt, Per Leg

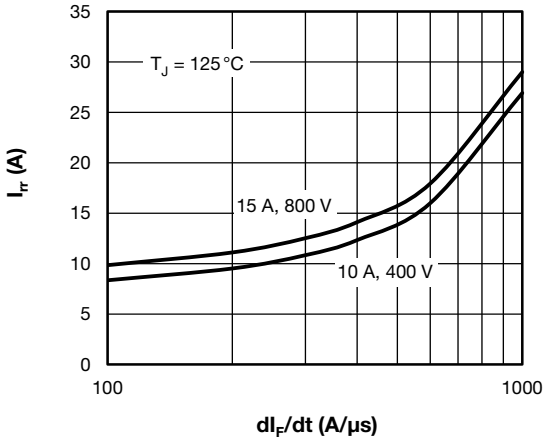


Fig. 9 - Typical Recovery Current vs. dI_F/dt, Per Leg

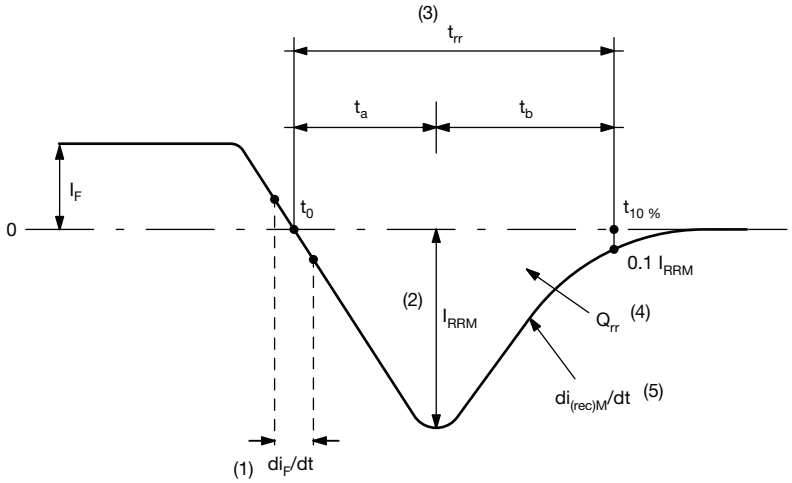


Fig. 10 - Reverse Recovery Waveform and Definitions

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-	C	5	T	X	30	12	-M3
	1	2	3	4	5	6	7	8

1 - Vishay Semiconductors product

2 - C = common cathode

3 - 5 = FRED generation 5

4 - Package: T = TO-247AD 3L

5 - X = hyperfast recovery

6 - Current rating (30 = 30 A)

7 - Voltage rating (12 = 1200 V)

8 - Environmental digit:

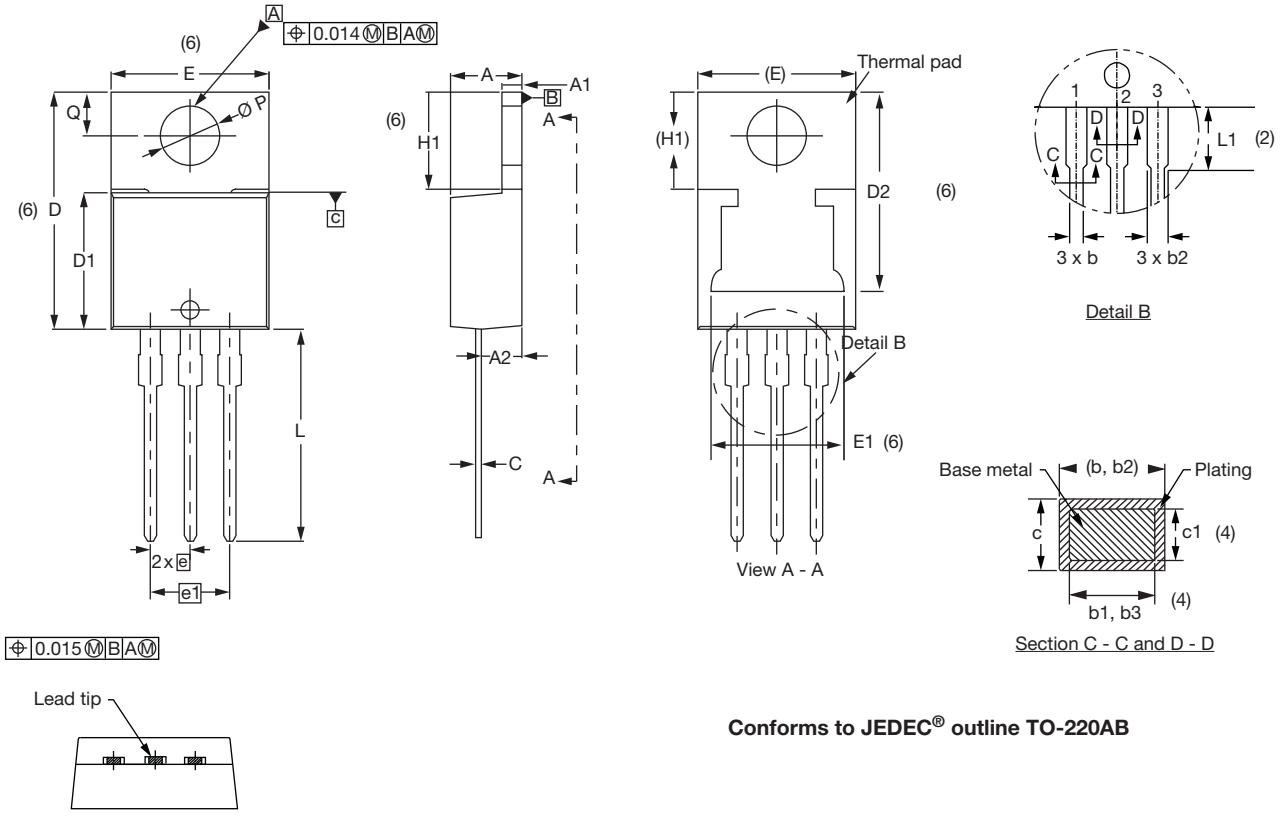
-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER TUBE**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-C5TX3012-M3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96154
Part marking information	www.vishay.com/doc?95028

3L TO-220AB

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
Ø P	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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