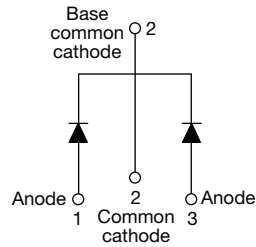
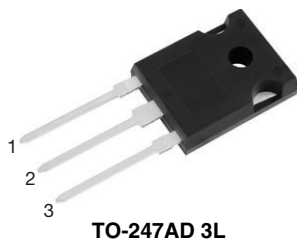


Hyperfast Rectifier, 2 x 15 A FRED Pt® G5



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



LINKS TO ADDITIONAL RESOURCES



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-247AD 3L

Molding compound meets UL 94 V-0 flammability rating

Terminals: matte tin plated leads, solderable per J-STD-002 and JE5D 22-B102

Polarity: as per marking device details

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$, per leg	15 A
V_R	1200 V
V_F at I_F at 125 °C	2.1 V
t_{rr}	29 ns
T_J max.	175 °C
Package	TO-247AD 3L
Circuit configuration	Common cathode

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	$I_{F(AV)}$	$T_C = 111$ °C, D = 0.50	15	A
Repetitive peak forward current, per leg	I_{FRM}	$T_C = 111$ °C, D = 0.50, f = 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 ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time, per leg	t_{rr}	$I_F = 1.0\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	29	44	ns
		$T_J = 25\text{ }^\circ\text{C}$	-	96	-	
			$T_J = 125\text{ }^\circ\text{C}$	-	137	
Peak recovery current, per leg	I_{RRM}	$I_F = 10\text{ A}$ $di_F/dt = 600\text{ A}/\mu\text{s}$ $V_R = 400\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	11.5	-	A
			$T_J = 125\text{ }^\circ\text{C}$	16	-	
Reverse recovery charge, per leg	Q_{rr}	$T_J = 25\text{ }^\circ\text{C}$	$T_J = 25\text{ }^\circ\text{C}$	375	-	nC
			$T_J = 125\text{ }^\circ\text{C}$	900	-	
Reverse recovery time, per leg	t_{rr}	$T_J = 25\text{ }^\circ\text{C}$	$T_J = 25\text{ }^\circ\text{C}$	77.5	-	ns
			$T_J = 125\text{ }^\circ\text{C}$	106	-	
Peak recovery current, per leg	I_{RRM}	$I_F = 15\text{ A}$ $di_F/dt = 1000\text{ A}/\mu\text{s}$ $V_R = 800\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	21	-	A
			$T_J = 125\text{ }^\circ\text{C}$	29	-	
Reverse recovery charge, per leg	Q_{rr}	$T_J = 25\text{ }^\circ\text{C}$	$T_J = 25\text{ }^\circ\text{C}$	680	-	nC
			$T_J = 125\text{ }^\circ\text{C}$	1600	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction-to-case, per leg	R_{thJC}		-	-	1.4	$^\circ\text{C}/\text{W}$
Weight			-	6.0	-	g
			-	0.21	-	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	$^\circ\text{C}$
Marking device		Case style TO-247AD 3L	C5PX3012L			

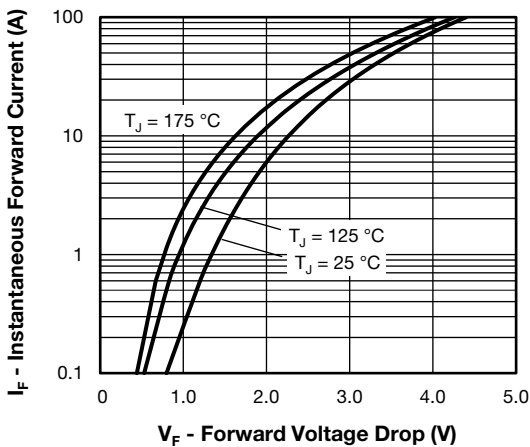


Fig. 1 - Forward Voltage Drop Characteristics, Per Leg

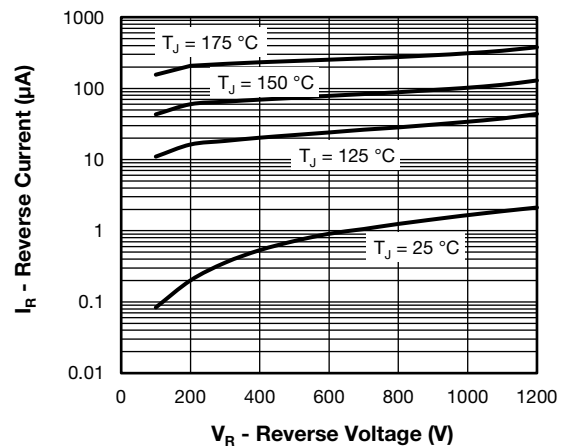


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage, Per Leg

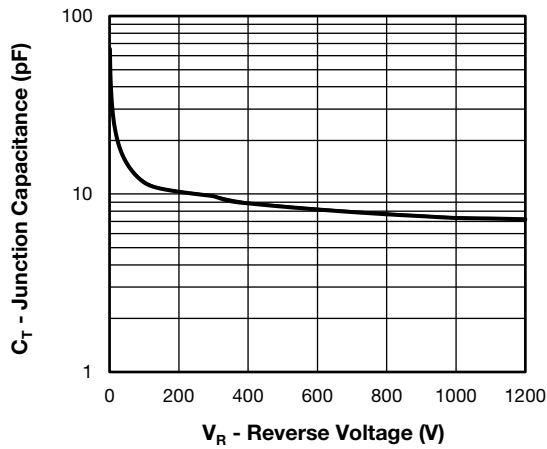


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, Per Leg

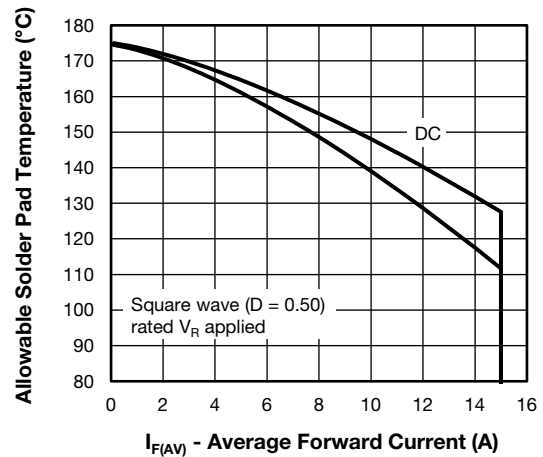


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current, Per Leg

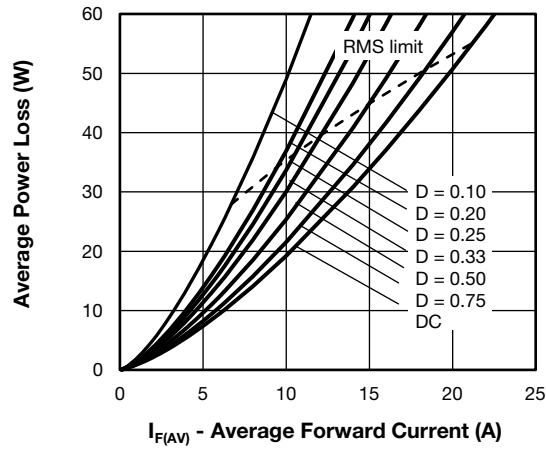


Fig. 5 - Forward Power Loss Characteristics, Per Leg

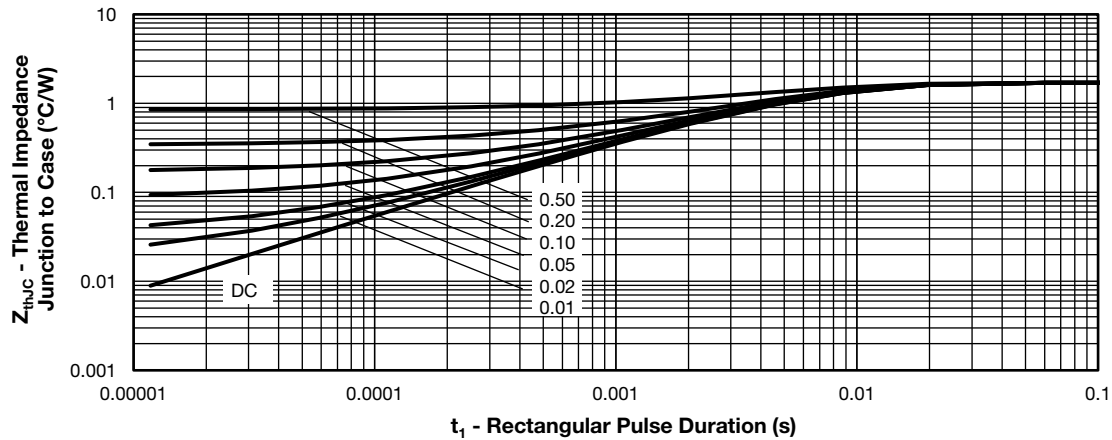


Fig. 6 - Transient Thermal Impedance, Junction to Case, Per Leg

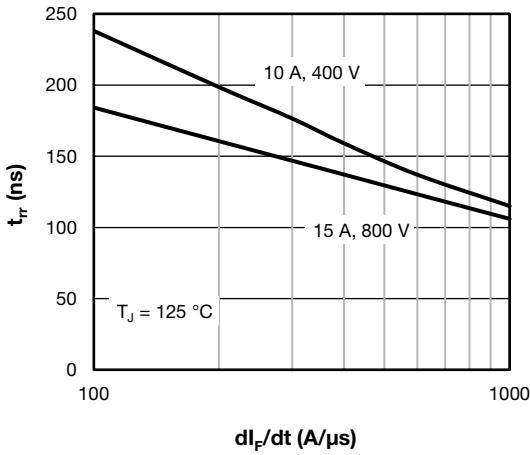


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt , Per Leg

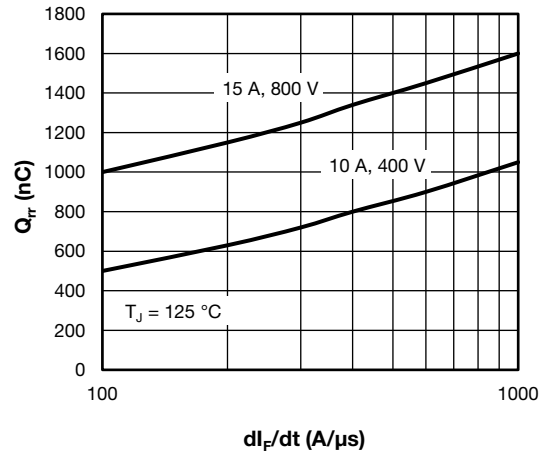


Fig. 8 - Typical Stored Charge vs. di_F/dt , Per Leg

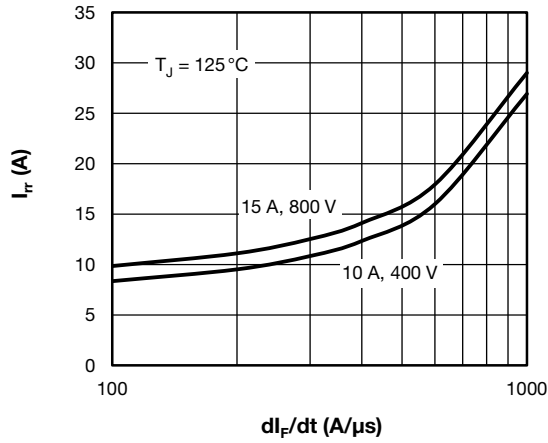


Fig. 9 - Typical Reverse Recovery Current vs. di_F/dt , Per Leg

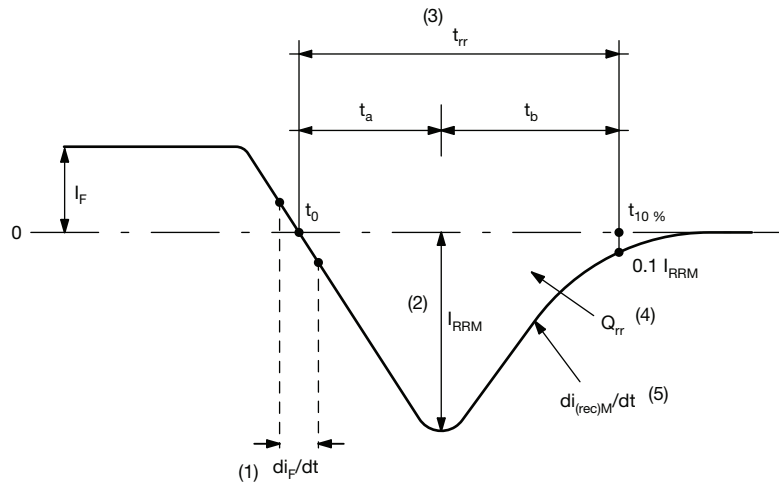


Fig. 10 - Reverse Recovery Waveform and Definitions

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

ORDERING INFORMATION TABLE

Device code	VS-	C	5	P	X	30	12	L	-N3
	1	2	3	4	5	6	7	8	9

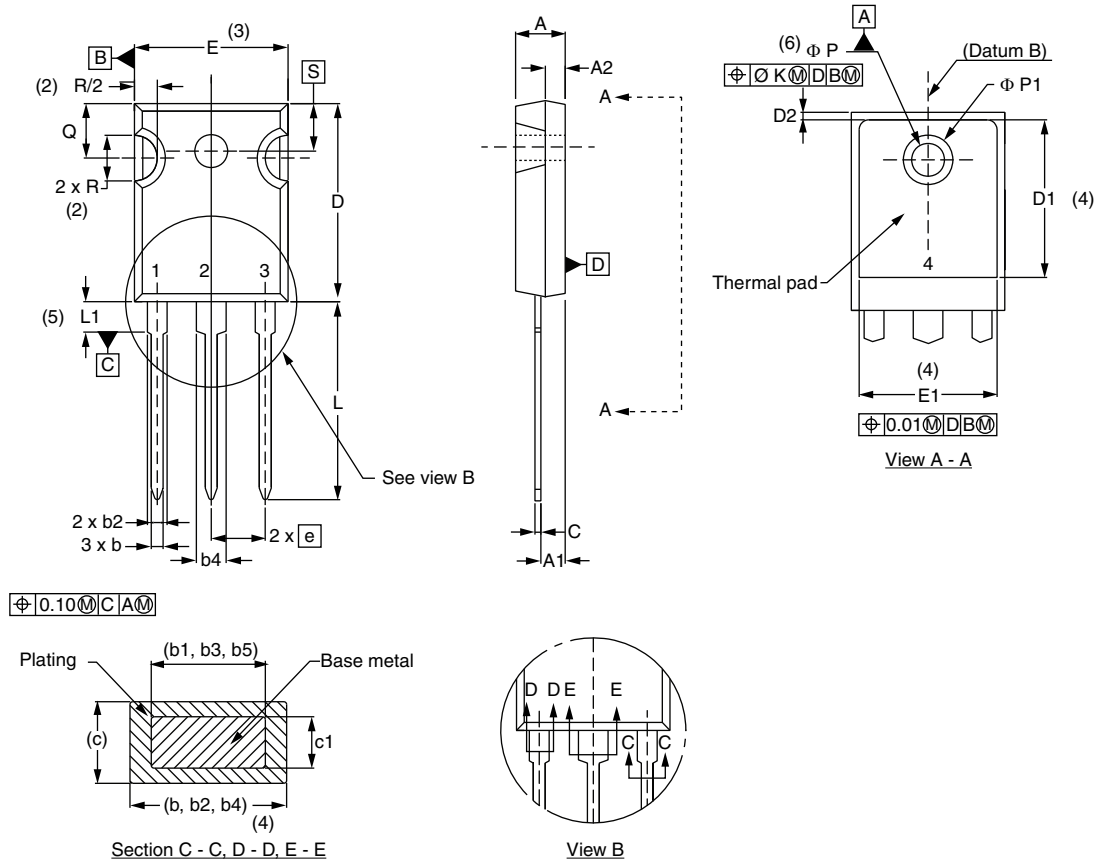
- | | | |
|----------|---|--|
| 1 | - | Vishay Semiconductors product |
| 2 | - | C = common cathode |
| 3 | - | 5 = FRED generation 5 |
| 4 | - | Package: P = TO-247AD 3L |
| 5 | - | X = hyperfast recovery |
| 6 | - | Current rating (30 = 30 A) |
| 7 | - | Voltage rating (12 = 1200 V) |
| 8 | - | L = long lead |
| 9 | - | 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-CPX3012L-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95626
Part marking information	www.vishay.com/doc?95007

TO-247AD 3L

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209		D2	0.51	1.30	0.020	0.051	
A1	2.21	2.59	0.087	0.102		E	15.29	15.87	0.602	0.625	3
A2	1.50	2.49	0.059	0.098		E1	13.46	-	0.53	-	
b	0.99	1.40	0.039	0.055		e	5.46 BSC		0.215 BSC		
b1	0.99	1.35	0.039	0.053		Ø K	0.254		0.010		
b2	1.65	2.39	0.065	0.094		L	19.81	20.32	0.780	0.800	
b3	1.65	2.34	0.065	0.092		L1	3.71	4.29	0.146	0.169	
b4	2.59	3.43	0.102	0.135		Ø P	3.56	3.66	0.14	0.144	
b5	2.59	3.38	0.102	0.133		Ø P1	-	6.98	-	0.275	
c	0.38	0.89	0.015	0.035		Q	5.31	5.69	0.209	0.224	
c1	0.38	0.84	0.015	0.033		R	4.52	5.49	0.178	0.216	
D	19.71	20.70	0.776	0.815	3	S	5.51 BSC		0.217 BSC		
D1	13.08	-	0.515	-	4						

Notes

- Dimensioning and tolerancing per ASME Y14.5M-1994
- Contour of slot optional
- Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body
- Thermal pad contour optional with dimensions D1 and E1
- Lead finish uncontrolled in L1
- 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")
- 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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