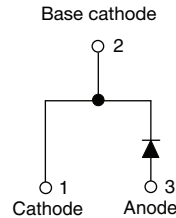
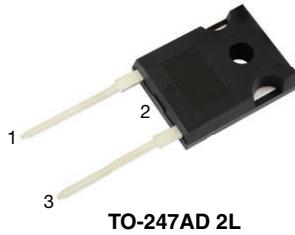


## Ultrafast Soft Recovery Diode, 30 A FRED Pt® Gen 4



### FEATURES

- Gen 4 FRED Pt® technology
- Low  $I_{RRM}$  and reverse recovery charge
- Very low forward voltage drop
- Polyimide passivated chip for high reliability standard
- 175 °C operating junction temperature
- AEC-Q101 qualified, meets JESD 201 class 1 whisker test
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### PRODUCT SUMMARY

Package	TO-247AD 2L
$I_{F(AV)}$	30 A
$V_R$	600 V
$V_F$ at $I_F$	1.19 V
$t_{rr}$ typ.	see Recovery table
$T_J$ max.	175 °C
Diode variation	Single die

### DESCRIPTION

Gen 4 Fred technology, state of the art, ultralow  $V_F$ , soft switching optimized for Discontinuous (Critical) Mode (DCM) and IGBT F/W diode.

The minimized conduction loss, optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Peak repetitive reverse voltage	$V_{RRM}$		600	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 131$ °C	30	A
Non-repetitive peak surge current	$I_{FSM}$	$T_C = 25$ °C, $t_p = 8.3$ ms half sine wave	240	
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	$V_{BR}, V_R$	$I_R = 100$ $\mu$ A	600	-	-	V
Forward voltage	$V_F$	$I_F = 30$ A	-	1.36	1.6	
		$I_F = 60$ A	-	1.6	-	
		$I_F = 30$ A, $T_J = 125$ °C	-	1.23	-	
		$I_F = 60$ A, $T_J = 125$ °C	-	1.5	-	
		$I_F = 30$ A, $T_J = 150$ °C	-	1.19	1.35	
		$I_F = 60$ A, $T_J = 150$ °C	-	1.48	-	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	-	50	$\mu$ A
		$T_J = 125$ °C, $V_R = V_R$ rated	-	-	500	
Junction capacitance	$C_T$	$V_R = 600$ V	-	18.3	-	pF



<b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	$I_F = 30\text{ A}$ $di_F/dt = 1000\text{ A}/\mu\text{s}$ $V_R = 400\text{ V}$	-	65	-	ns
		$T_J = 125\text{ }^\circ\text{C}$		-	90	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$		-	18	-	A
		$T_J = 125\text{ }^\circ\text{C}$		-	32	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$		-	850	-	nC
		$T_J = 125\text{ }^\circ\text{C}$		-	1850	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	$R_{thJC}$			-	-	1	$^\circ\text{C}/\text{W}$
Thermal resistance, case to heatsink	$R_{thCS}$			-	0.4	-	
Weight				-	6.0	-	g
				-	0.21	-	oz.
Mounting torque				6.0 (5)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-247AD 2L		E4PU3006LH			

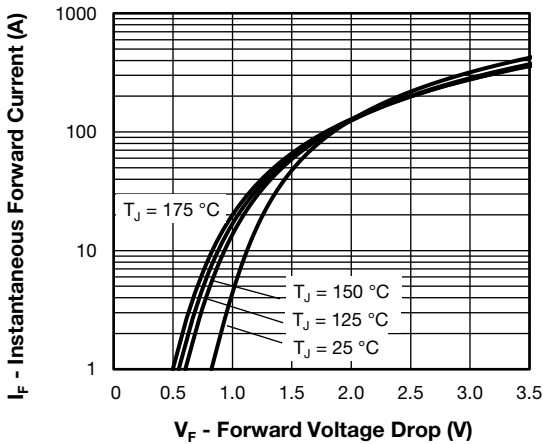


Fig. 1 - Typical Forward Voltage Drop Characteristics

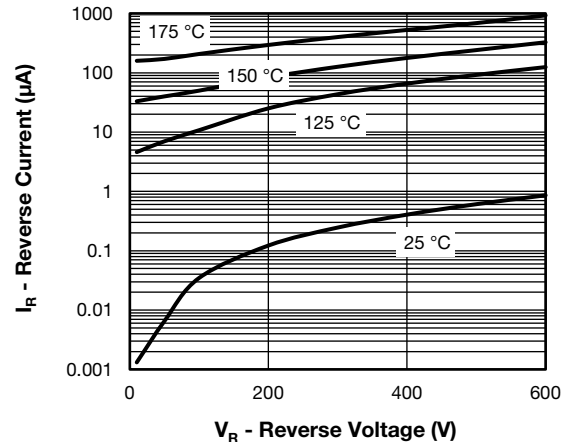


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

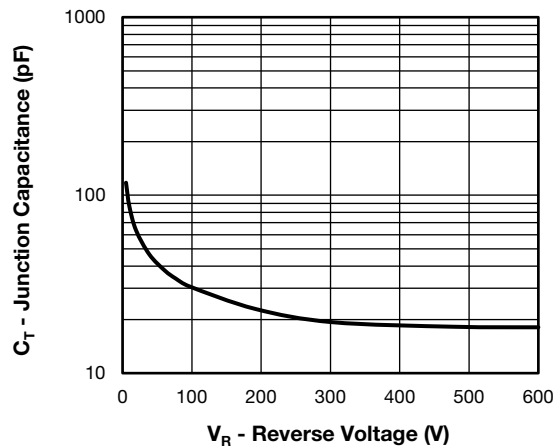


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

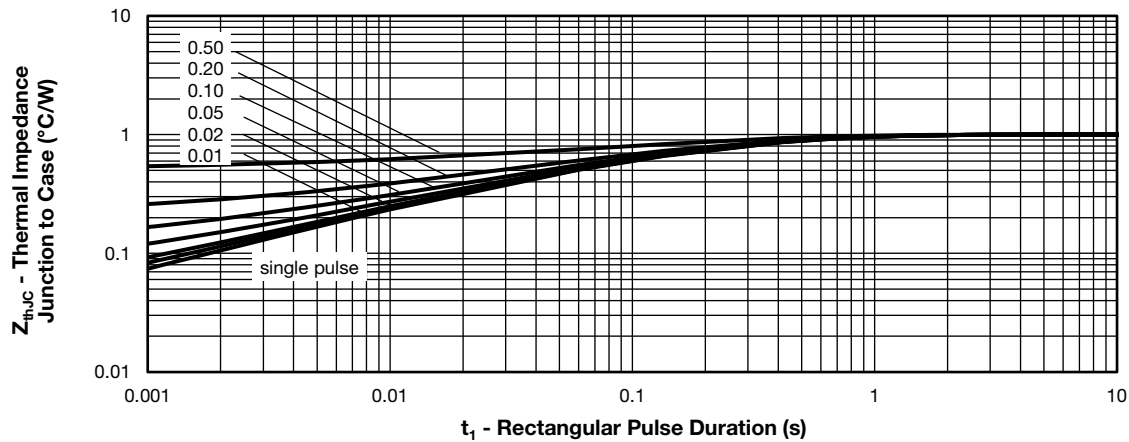


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics

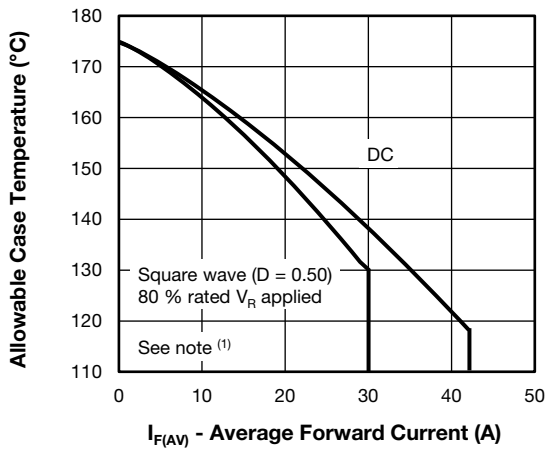


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

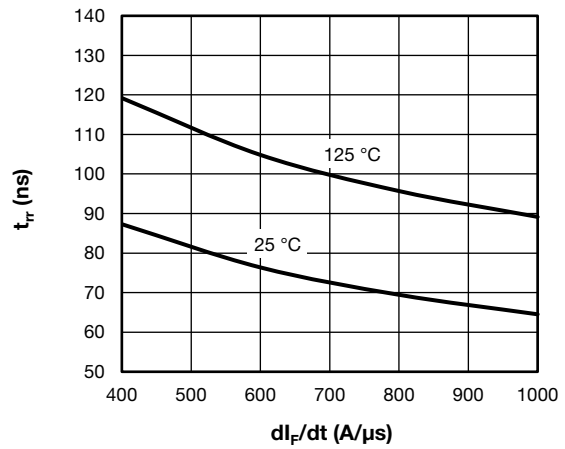


Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$

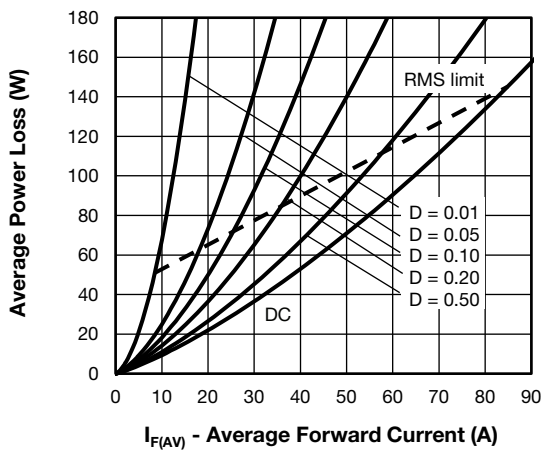


Fig. 6 - Forward Power Loss Characteristics

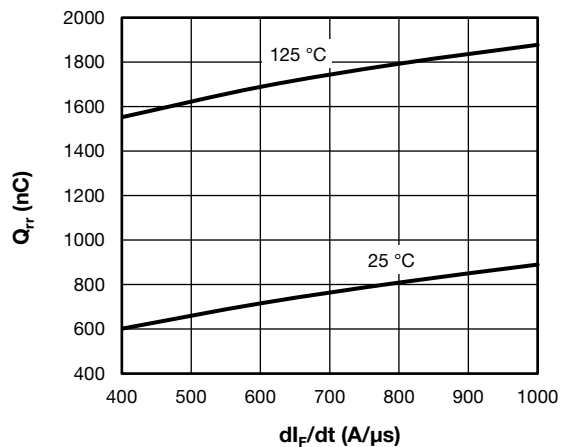


Fig. 8 - Typical Stored Charge vs.  $dI_F/dt$

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;
- $P_d$  = forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see Fig.5)
- $P_{dREV}$  = inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_R$  = rated  $V_R$

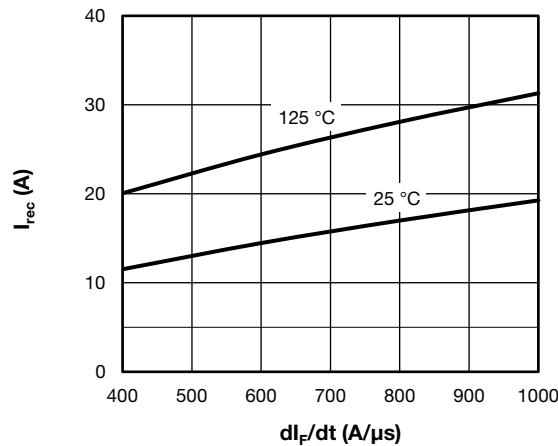


Fig. 9 - Typical Reverse Current vs. di/dt

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>E</b>	<b>4</b>	<b>P</b>	<b>U</b>	<b>30</b>	<b>06</b>	<b>L</b>	<b>H</b>	<b>N3</b>
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

- 1** - Vishay Semiconductors product
- 2** - Circuit configuration:  
E = single diode
- 3** - FRED Pt Gen 4
- 4** - P = TO-247 package
- 5** - Process type:  
U = ultrafast recovery
- 6** - Current rating (30 = 30 A)
- 7** - Voltage rating (06 = 600 V)
- 8** - Package: L = long lead
- 9** - H = AEC-Q 101 qualified
- 10** - Environmental digit:  
N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

<b>ORDERING INFORMATION</b> (Example)			
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-E4PU3006LHN3	25	500	Antistatic plastic tube

<b>LINKS TO RELATED DOCUMENTS</b>		
Dimensions	TO-247AD 2L	<a href="http://www.vishay.com/doc?95536">www.vishay.com/doc?95536</a>
Part marking information	TO-247AD 2L	<a href="http://www.vishay.com/doc?95648">www.vishay.com/doc?95648</a>

### TO-247AD 2L

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

**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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