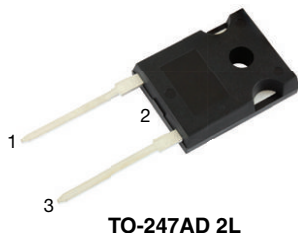
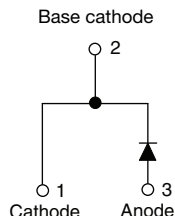


Hyperfast Soft Recovery Diode, 60 A FRED Pt® Gen 4


TO-247AD 2L


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 1A whisker test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT
HALOGEN
FREE

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 minimized the switching losses and reduce over dissipation in the switching element and snubbers.

PRIMARY CHARACTERISTICS

$I_{F(AV)}$	60 A
V_R	600 V
V_F at I_F	1.48 V
t_{rr} typ.	see Recovery table
T_J max.	175 °C
Package	TO-247AD 2L
Circuit configuration	Single

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	V_R		600	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 106\text{ °C}$	60	A
Single pulse forward current	I_{FSM}	$T_C = 25\text{ °C}$, $t_p = 8.3\text{ ms}$, half sine wave	425	
Operating junction and storage temperatures	T_J, T_{Stg}		-55 to +175	°C

ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ °C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	V_{BR}, V_R	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	V_F	$I_F = 50\text{ A}$	-	1.68	-	
		$I_F = 60\text{ A}$	-	1.75	2.0	
		$I_F = 50\text{ A}$, $T_J = 125\text{ °C}$	-	1.44	-	
		$I_F = 60\text{ A}$, $T_J = 125\text{ °C}$	-	1.55	-	
		$I_F = 50\text{ A}$, $T_J = 150\text{ °C}$	-	1.39	-	
		$I_F = 60\text{ A}$, $T_J = 150\text{ °C}$	-	1.48	1.65	
Reverse leakage current	I_R	$V_R = V_R$ rated	-	-	50	μA
		$T_J = 125\text{ °C}$, $V_R = V_R$ rated	-	-	500	
Junction capacitance	C_T	$V_R = 600\text{ V}$	-	30	-	pF

**DYNAMIC RECOVERY CHARACTERISTICS** ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	-	68	-	ns
		$T_J = 125\text{ }^{\circ}\text{C}$	-	92	-	
Peak recovery current	I_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$	-	20	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	40	-	
Reverse recovery charge	Q_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	-	945	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	2500	-	

THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	R_{thJC}		-	-	0.6	$^{\circ}\text{C/W}$
Thermal resistance, case to heat sink	R_{thCS}	Mounting surface, flat, smooth and greased	-	0.25	-	
Weight			-	6.0	-	g
			-	0.21	-	oz.
Mounting torque			6.0 (5)	-	12 (20)	kgf · cm (lbf · in)
Marking device		Case style TO-247AD 2L	E4PH6006LH			

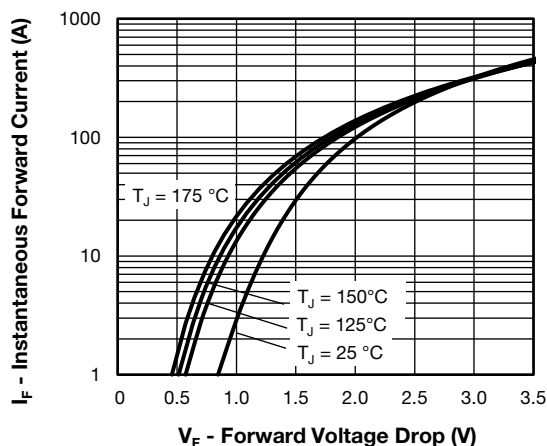


Fig. 1 - Typical Forward Voltage Drop Characteristics

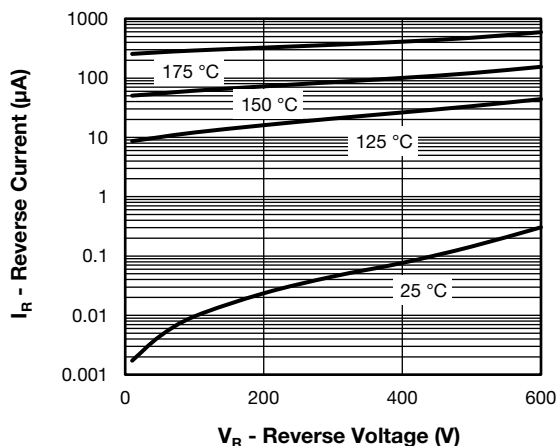


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

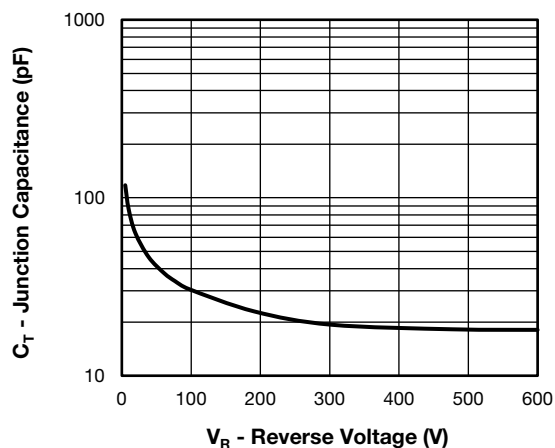


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

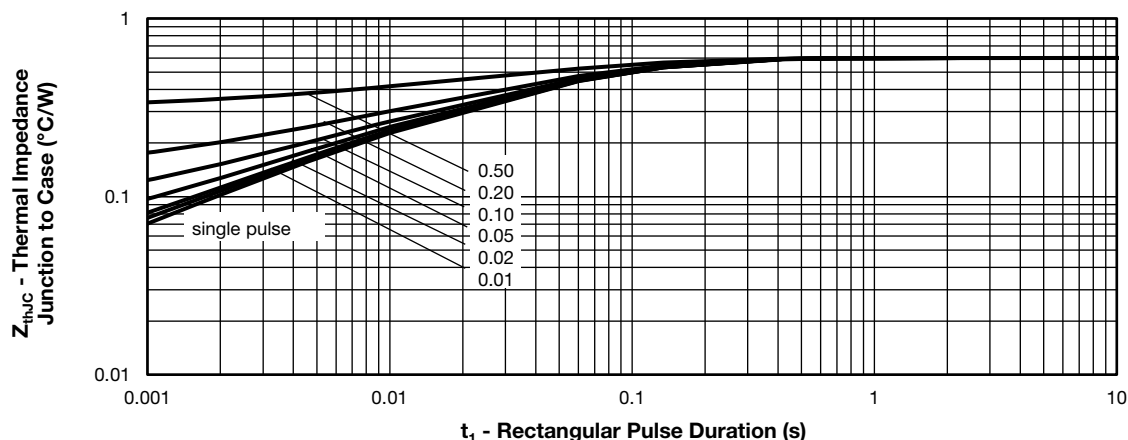
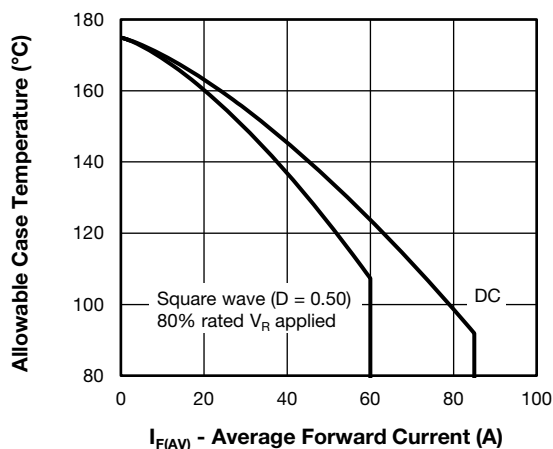

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics


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

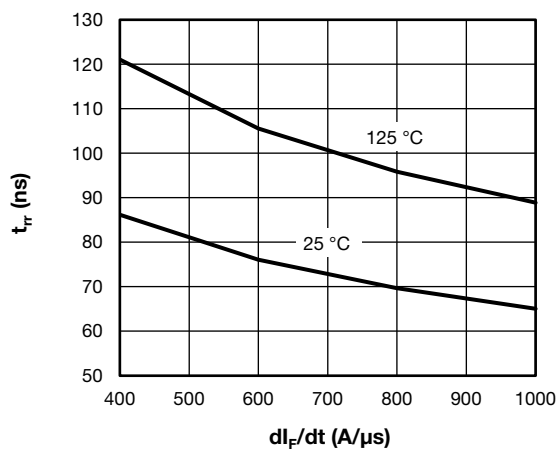
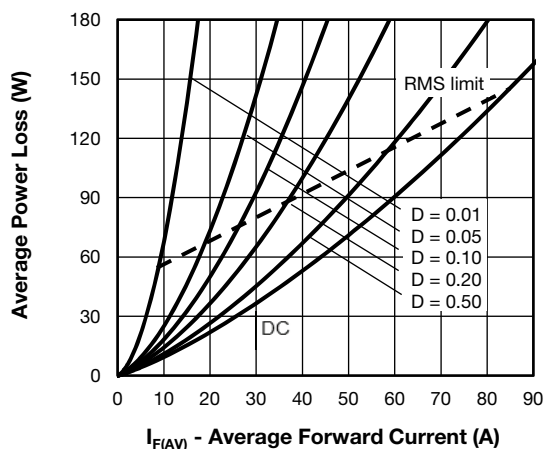
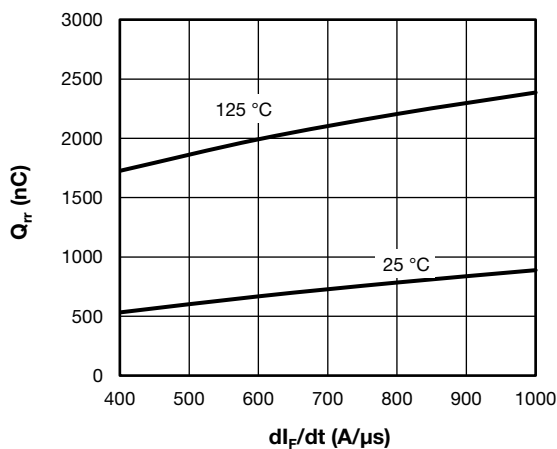
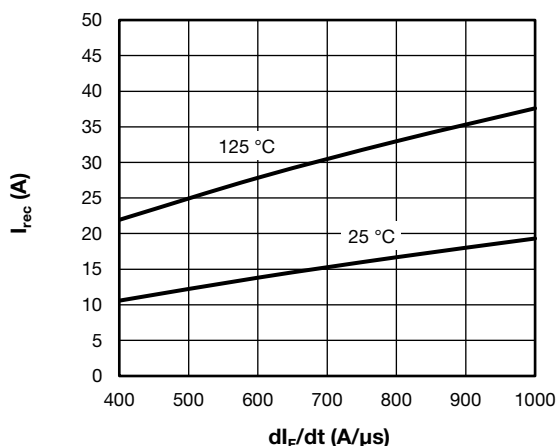

Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt


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 Recovery vs. dI_F/dt

ORDERING INFORMATION TABLE

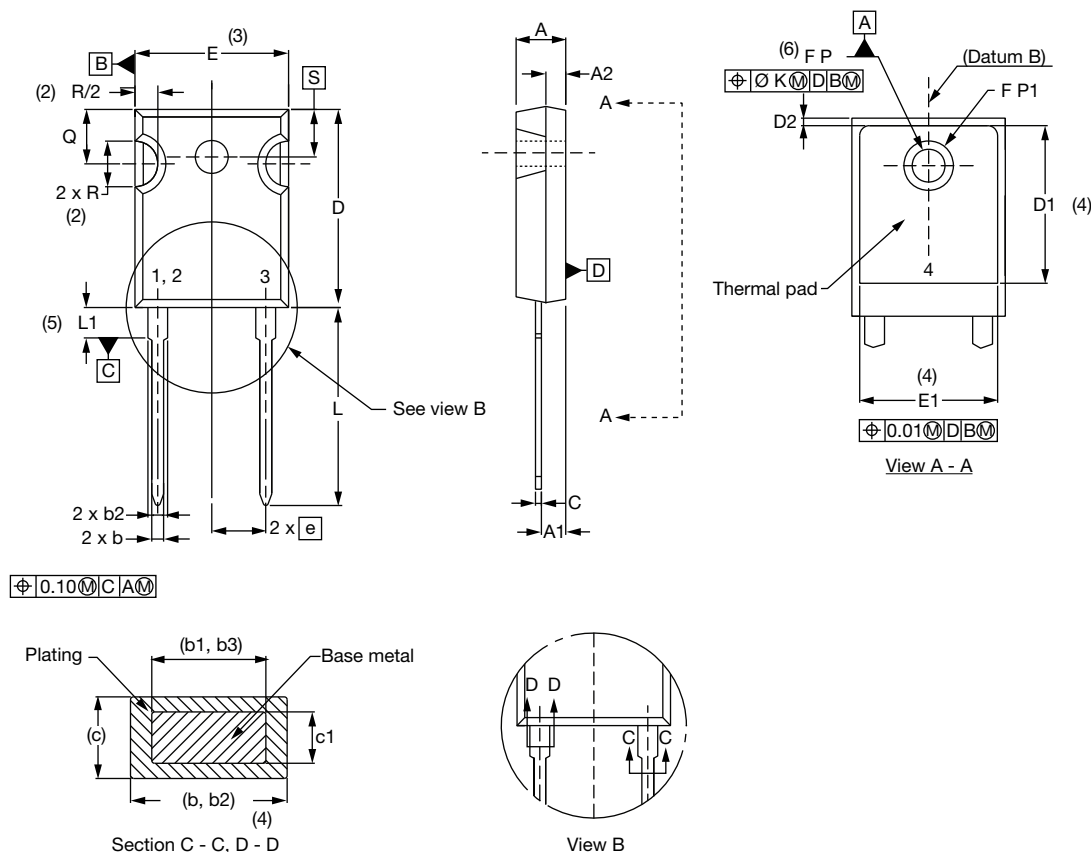
Device code	VS-	E	4	P	H	60	06	L	H	N3
	1	2	3	4	5	6	7	8	9	10
	1	- Vishay Semiconductors product								
	2	- Circuit configuration: E = single diode 2 pins								
	3	- FRED Gen 4								
	4	- P = TO-247 package								
	5	- Process type: H = Hyperfast recovery								
	6	- Current rating (60 = 60 A)								
	7	- Voltage rating (06 = 600 V)								
	8	- L = long lead								
	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-E4PH6006LHN3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-247AD 2L	www.vishay.com/doc?95536
Part marking information	TO-247AD 2L	www.vishay.com/doc?95648

TO-247AD 2L

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
b	0.99	1.40	0.039	0.055	
b1	0.99	1.35	0.039	0.053	
b2	1.65	2.39	0.065	0.094	
b3	1.65	2.34	0.065	0.092	
c	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4
D2	0.51	1.35	0.020	0.053	

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
e	5.46 BSC		0.215 BSC		
Ø K	0.254		0.010		
L	19.81	20.32	0.780	0.800	
L1	3.71	4.29	0.146	0.169	
Ø P	3.56	3.66	0.14	0.144	
Ø P1	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178	0.216	
S	5.51 BSC		0.217 BSC		

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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