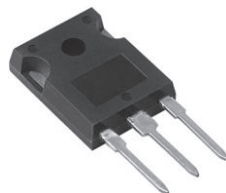
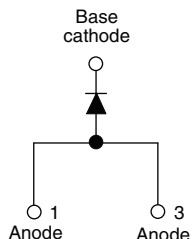


Hyperfast Rectifier, 60 A FRED Pt®


TO-247AC


FEATURES

- Hyperfast recovery time
- Low forward voltage drop
- Low leakage current
- Soft recovery device
- 175 °C operating junction temperature
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

DESCRIPTION / APPLICATIONS

VS-60APH03-N3 series are the state of the art ultrafast recovery rectifiers designed with optimized performance of forward voltage drop and ultrafast recovery time.

The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for PDP and use in the output rectification stage for SMPS, UPS, DC/DC converters as well as freewheeling diodes in low voltage inverters.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

PRODUCT SUMMARY

Package	TO-247AC
$I_{F(AV)}$	60 A
V_R	300 V
V_F at I_F	0.85 V
t_{rr} typ.	28 ns
T_J max.	175 °C
Diode variation	Single die

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		300	V
Continuous forward current	$I_{F(AV)}$	$T_C = 103\text{ °C}$	60	A
Single pulse forward current	I_{FSM}	$T_J = 25\text{ °C}$, 10 ms sine pulse	450	
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	$I_R = 100\text{ }\mu\text{A}$	300	-	-	V
Forward voltage	V_F	$I_F = 30\text{ A}$	-	1.0	1.25	
		$I_F = 60\text{ A}$	-	-	1.45	
		$I_F = 30\text{ A}, T_J = 125\text{ °C}$	-	0.85	1.10	
		$I_F = 60\text{ A}, T_J = 125\text{ °C}$	-	-	1.30	
Reverse leakage current	I_R	$V_R = V_R$ rated	-	-	10	μA
		$T_J = 125\text{ °C}, V_R = V_R$ rated	-	-	100	
Junction capacitance	C_T	$V_R = 300\text{ V}$	-	70	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	3.5	-	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	t_{rr}	$I_F = 1.0\text{ A}$, $dI_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	28	-	ns
		$I_F = 1.0\text{ A}$, $dI_F/dt = 50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	34	-	
		$T_J = 25\text{ }^{\circ}\text{C}$	-	42	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	64	-	
Peak recovery current	I_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$	-	3.0	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	8.5	-	
Reverse recovery charge	Q_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	-	65	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	273	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		-55	-	175	$^{\circ}\text{C}$
Thermal resistance, junction to case	R_{thJC}		-	0.56	0.80	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	40	
Typical thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth, and greased	-	0.4	-	
Approximate Weight			-	6.0	-	g
			-	0.22	-	oz.
Mounting torque			6.0	-	12	kgf. cm
			(12)	-	(10)	(lbf.in)
Marking device		Case style TO-247AC	60APH03			

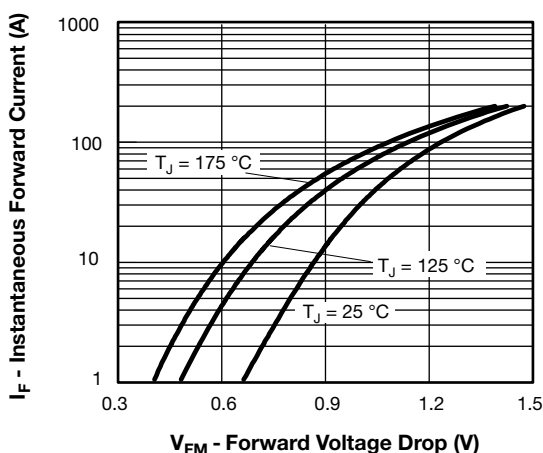


Fig. 1 - Typical Forward Voltage Drop Characteristics

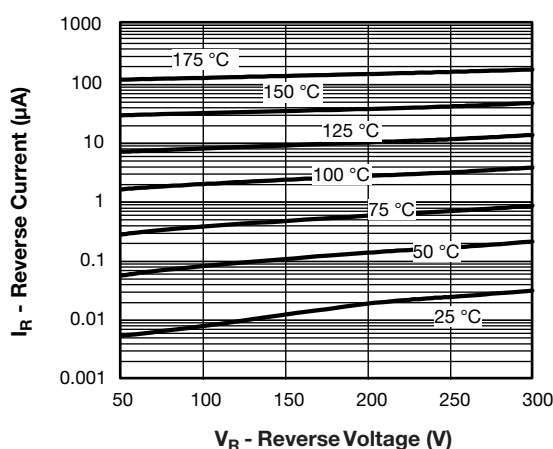


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

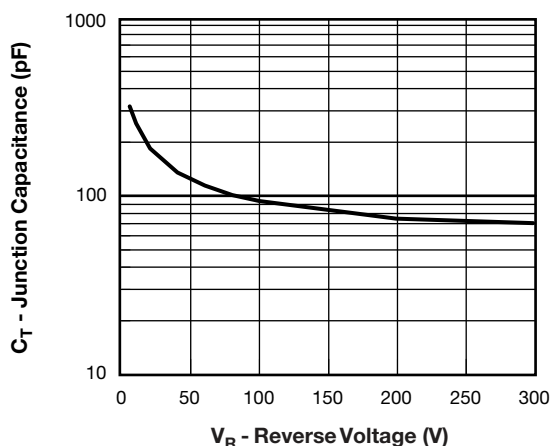


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

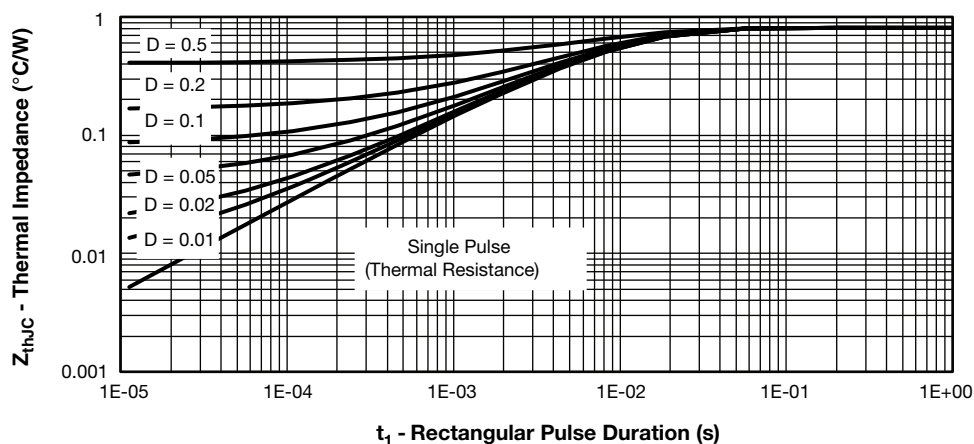
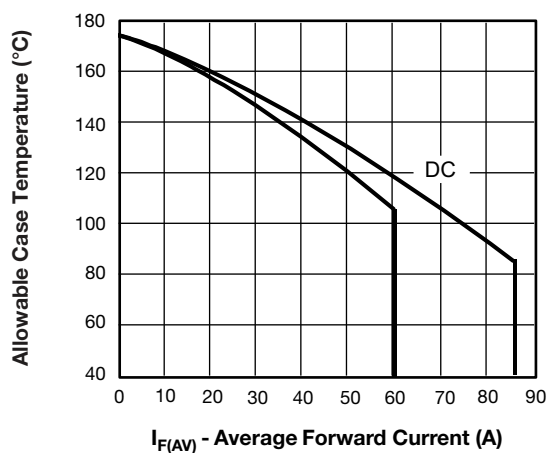

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics


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

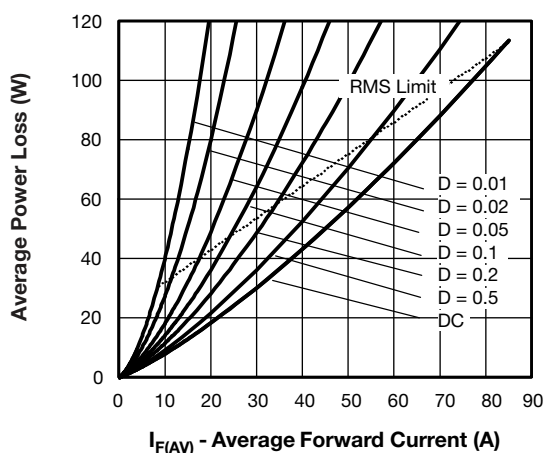


Fig. 6 - Forward Power Loss Characteristics

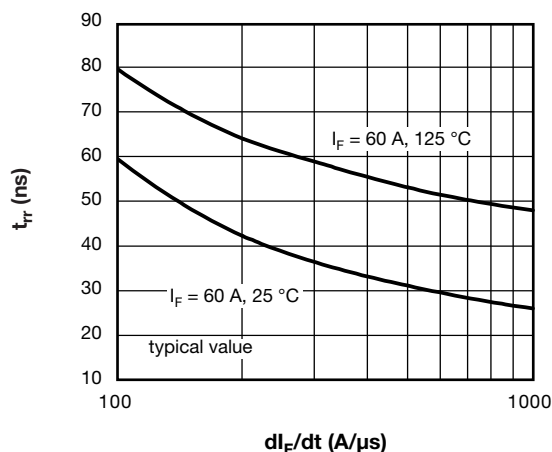
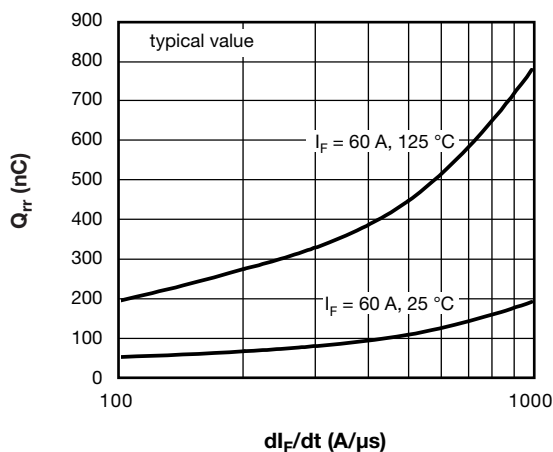
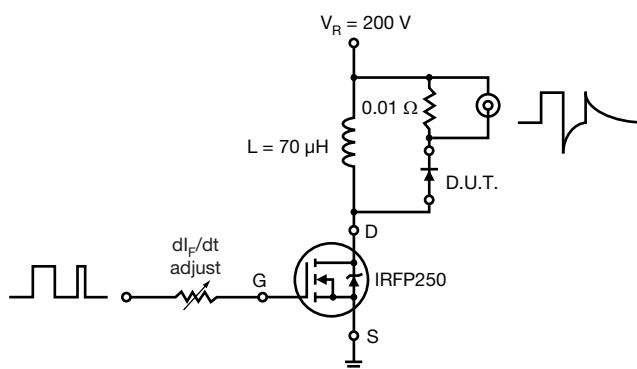

Fig. 7 - Typical Reverse Recovery vs. dI_F/dt

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


Fig. 9 - Reverse Recovery Parameter Test Circuit

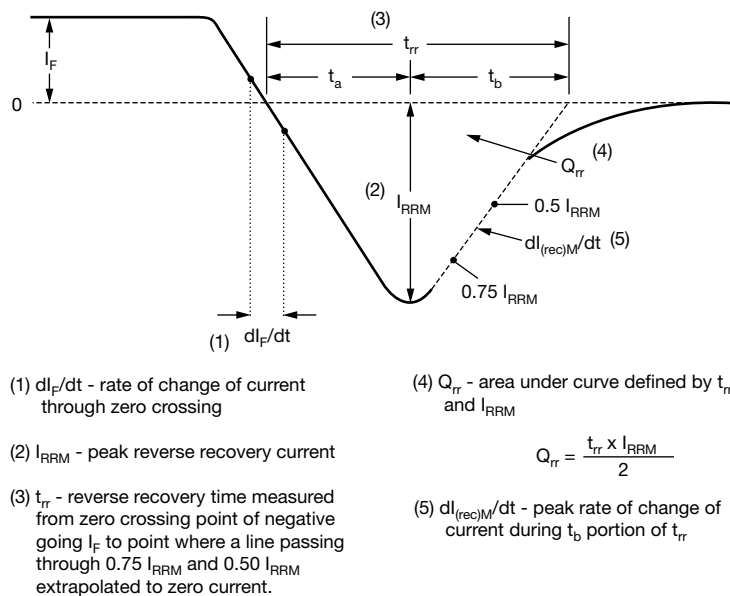


Fig. 10 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

Device code	VS-	60	A	P	H	03	-N3
	1	2	3	4	5	6	7
	1	- Vishay Semiconductors product					
	2	- Current rating (60 = 60 A)					
	3	- Circuit configuration: A = single diode					
	4	- P = TO-247AC					
	5	- H = hyperfast rectifier					
	6	- Voltage code (03 = 300 V)					
	7	- N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free					

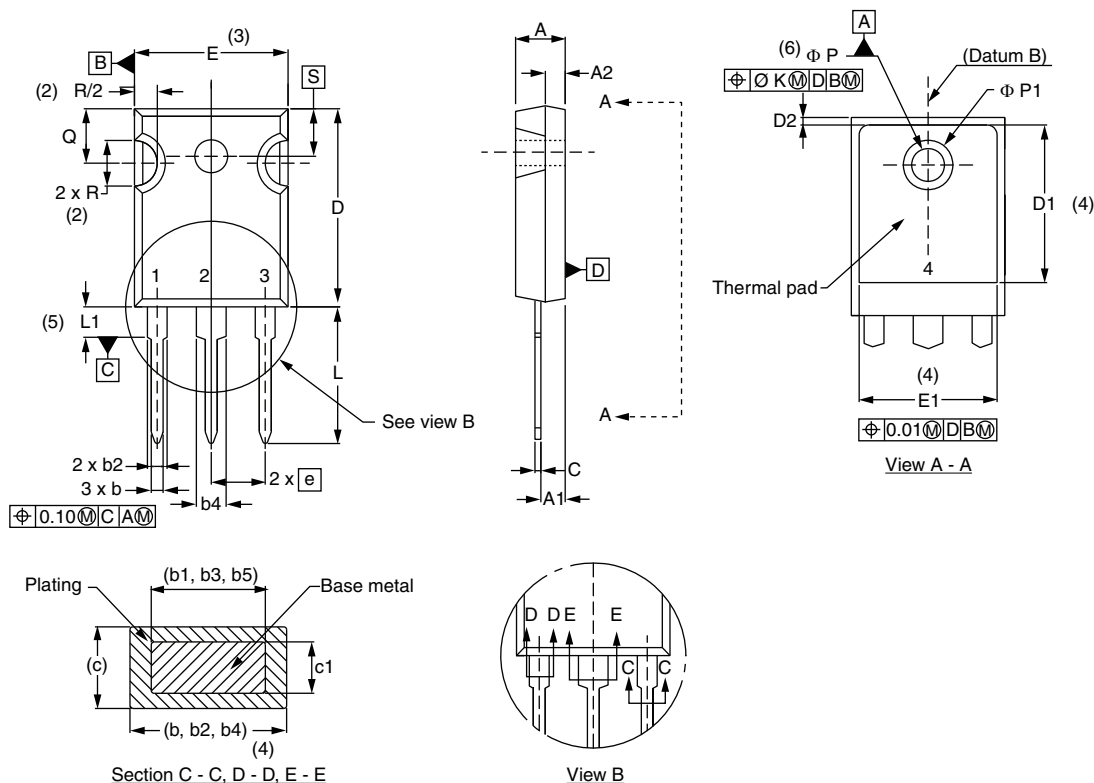
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-60APH03-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95542
Part marking information	www.vishay.com/doc?95007
SPICE model	www.vishay.com/doc?96075



TO-247AC - 50 mils L/F

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	1.17	1.37	0.046	0.054	
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	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
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

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	0.51	1.35	0.020	0.053	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
e	5.46 BSC		0.215 BSC		
ΦK	0.254		0.010		
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
ΦP	3.56	3.66	0.14	0.144	
$\Phi P1$	-	7.39	-	0.291	
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. 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) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) ΦP 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 c and Q



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