



ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX. UNITS
Cathode to anode breakdown voltage	V_{BR}	$I_R = 100\text{ }\mu\text{A}$		600	-	- V
Maximum forward voltage	V_{FM}	$I_F = 4.0\text{ A}$	See fig. 1	-	1.5	1.8
		$I_F = 8.0\text{ A}$		-	1.8	2.2
		$I_F = 4.0\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$		-	1.4	1.7
Maximum reverse leakage current	I_{RM}	$V_R = V_R\text{ rated}$	See fig. 2	-	0.17	3.0
		$T_J = 125\text{ }^{\circ}\text{C}, V_R = 0.8 \times V_R\text{ rated}$		-	44	300 μA
Junction capacitance	C_T	$V_R = 200\text{ V}$	See fig. 3	-	4.0	8.0 pF
Series inductance	L_S	Measured lead to lead 5 mm from package body		-	8.0	- 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 See fig. 5, 6 and 16	t_{rr}	$I_F = 1.0\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}, V_R = 30\text{ V}$		-	17	- ns
	t_{rr1}	$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 4\text{ A}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$	-	28	42
	t_{rr2}	$T_J = 125\text{ }^{\circ}\text{C}$		-	38	57
Peak recovery current See fig. 7 and 8	I_{RRM1}	$T_J = 25\text{ }^{\circ}\text{C}$		-	2.9	5.2 A
	I_{RRM2}	$T_J = 125\text{ }^{\circ}\text{C}$		-	3.7	6.7
Reverse recovery charge See fig. 9 and 10	Q_{rr1}	$T_J = 25\text{ }^{\circ}\text{C}$		-	40	60 nC
	Q_{rr2}	$T_J = 125\text{ }^{\circ}\text{C}$		-	70	105
Peak rate of fall of recovery current during t_b See fig. 11 and 12	$dI_{(rec)M}/dt1$	$T_J = 25\text{ }^{\circ}\text{C}$		-	280	- $\text{A}/\mu\text{s}$
	$dI_{(rec)M}/dt2$	$T_J = 125\text{ }^{\circ}\text{C}$		-	235	-

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX. UNITS
Lead temperature	T_{lead}	0.063" from case (1.6 mm) for 10 s		-	-	300 $^{\circ}\text{C}$
Thermal resistance, junction to case	R_{thJC}			-	-	5.0
Thermal resistance, junction to ambient	R_{thA}	Typical socket mount		-	-	80 K/W
Thermal resistance, case to heatsink	R_{thS}	Mounting surface, flat, smooth and greased		-	0.5	-
Weight				-	2.0	- g
				-	0.07	- oz.
Mounting torque				6.0 (5.0)	-	12 (10) kgf · cm (lb · in)
Marking device		Case style TO-220AC		HFA04TB60		

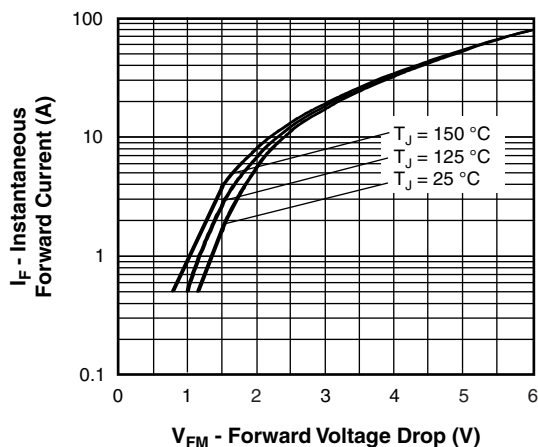


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

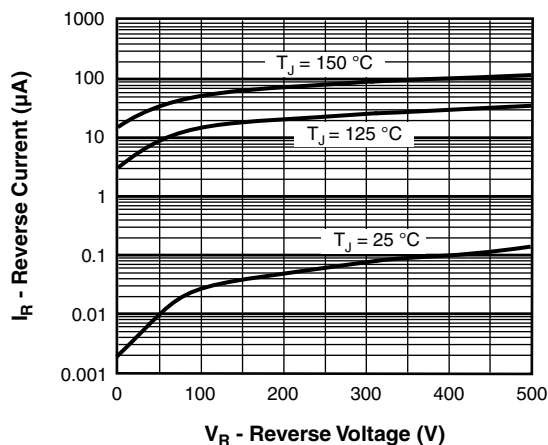


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

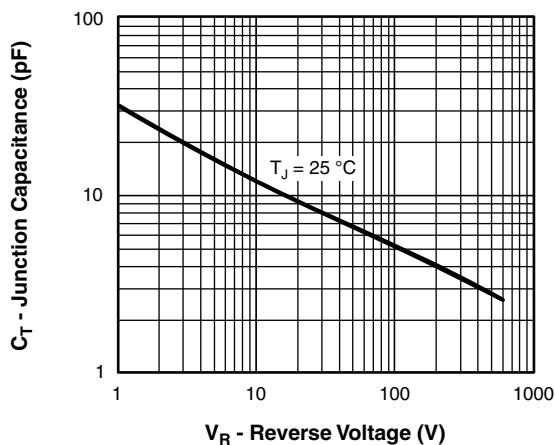


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

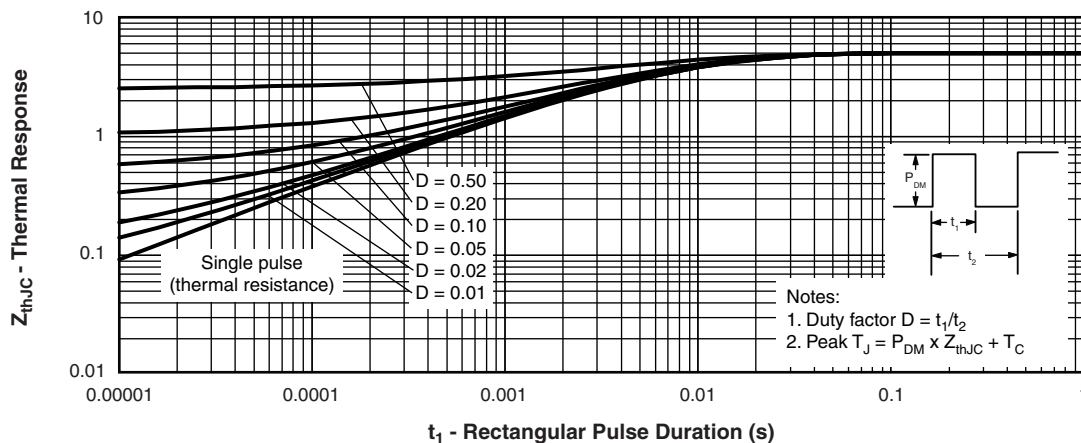
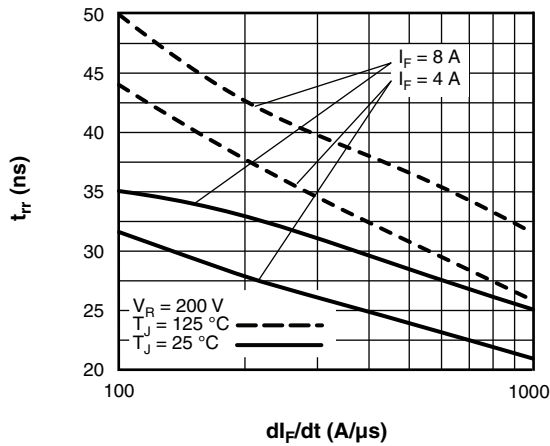
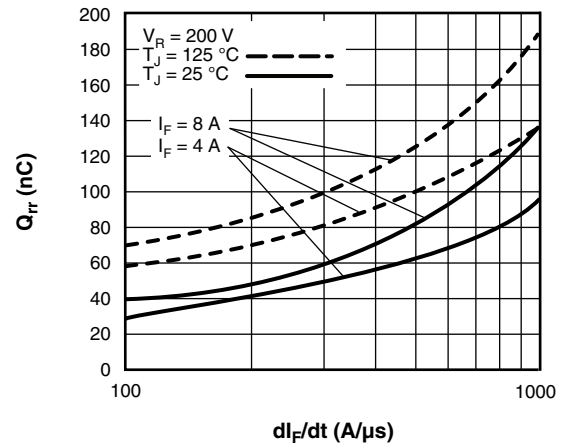
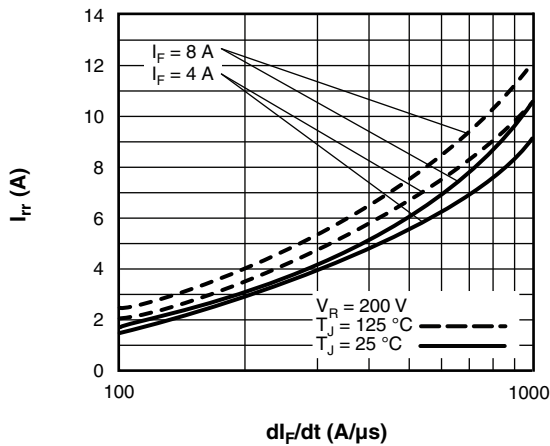
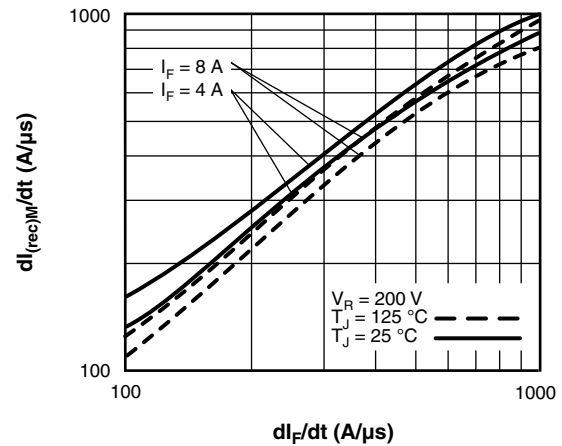


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics


Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt

Fig. 7 - Typical Stored Charge vs. dI_F/dt

Fig. 6 - Typical Recovery Current vs. dI_F/dt

Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt

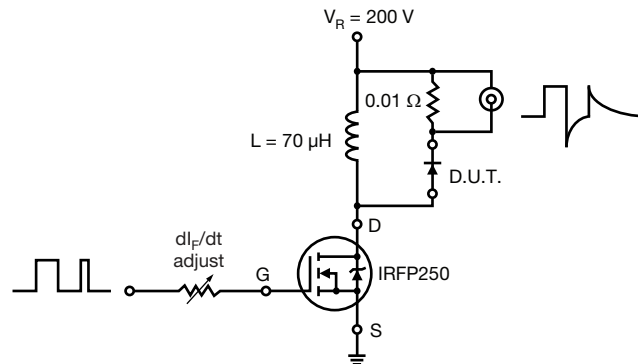


Fig. 9 - Reverse Recovery Parameter Test Circuit

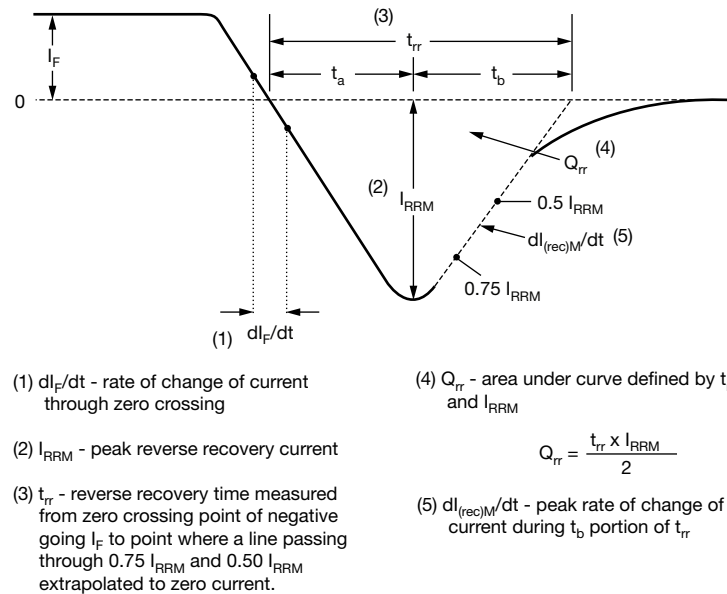


Fig. 10 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

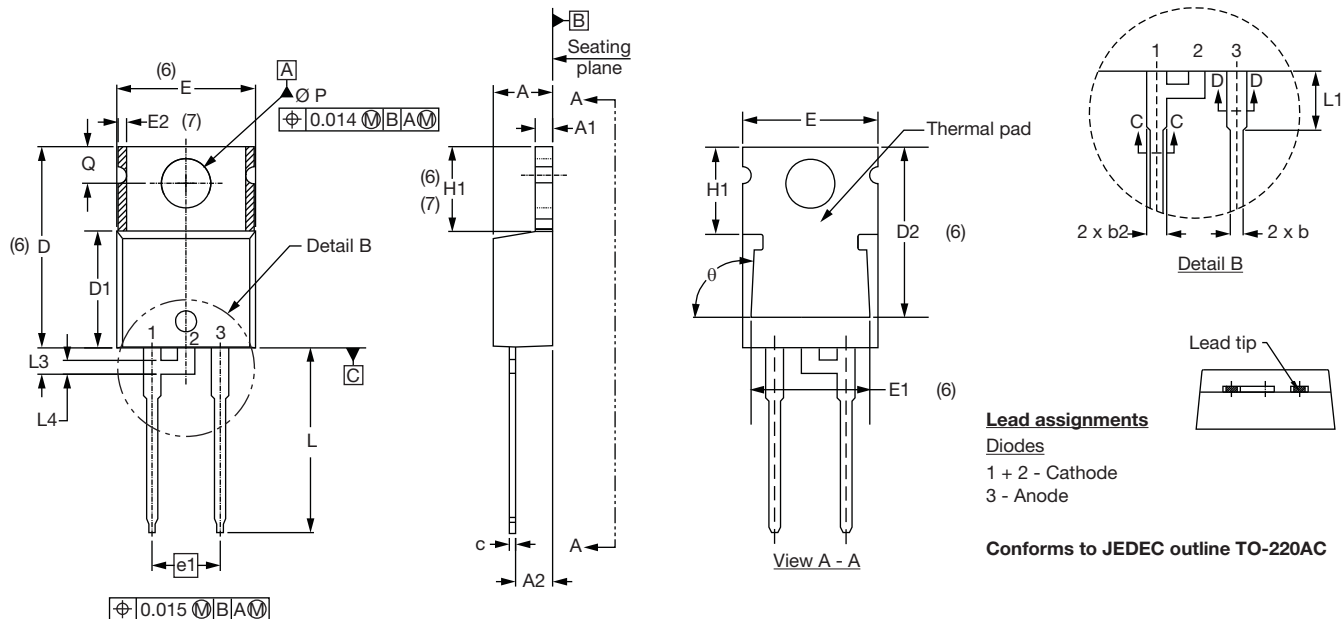
Device code	VS-	HF	A	04	TB	60	PbF
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
	1 - Vishay Semiconductors product 2 - HEXFRED® family 3 - Electron irradiated 4 - Current rating (04 = 4 A) 5 - Package: TB = TO-220AC 6 - Voltage rating (60 = 600 V) 7 - Environmental digit: PbF = lead (Pb)-free and RoHS-compliant -N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free						

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-HFA04TB60PbF	50	1000	Antistatic plastic tube
VS-HFA04TB60-N3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95221
Part marking information	TO-220ACPbF www.vishay.com/doc?95224
	TO-220AC-N3 www.vishay.com/doc?95068

TO-220AC

DIMENSIONS in millimeters and inches



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	2.56	2.92	0.101	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	15.25	0.585	0.600	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	12.88	0.460	0.507	6
E	10.11	10.51	0.398	0.414	3, 6

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
E1	6.86	8.89	0.270	0.350	6
E2	-	0.76	-	0.030	7
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, 7
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
L3	1.78	2.13	0.070	0.084	
L4	0.76	1.27	0.030	0.050	2
Ø P	3.54	3.73	0.139	0.147	
Q	2.60	3.00	0.102	0.118	
θ	90° to 93°		90° to 93°		

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 dimension: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2 and E1
- (7) Dimension E2 x H1 define a zone where stamping and singulation irregularities are allowed
- (8) Outline conforms to JEDEC TO-220, D2 (minimum) where dimensions are derived from the actual package outline



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