



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	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}	$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 4.0\text{ A}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$	-	28	42
	t_{rr2}	$T_J = 125\text{ }^{\circ}\text{C}$		-	38	57
Peak recovery current	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. 7	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. 8	$dI_{(rec)M}/dt1$	$T_J = 25\text{ }^{\circ}\text{C}$		-	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 K/W
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount		-	-	80
Weight				-	2.0	- g
				-	0.07	- oz.
Marking device		Case style TO-263AB (D ² PAK)		HFA04TB60S		

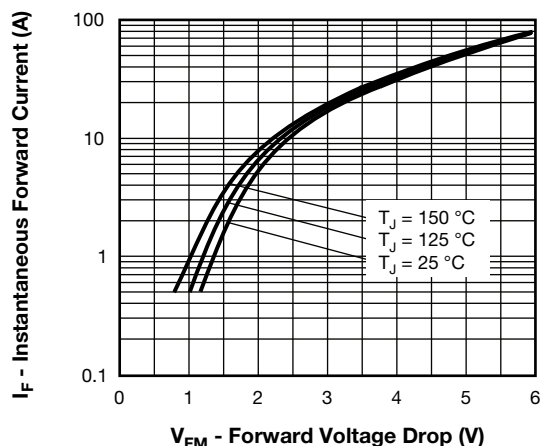


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

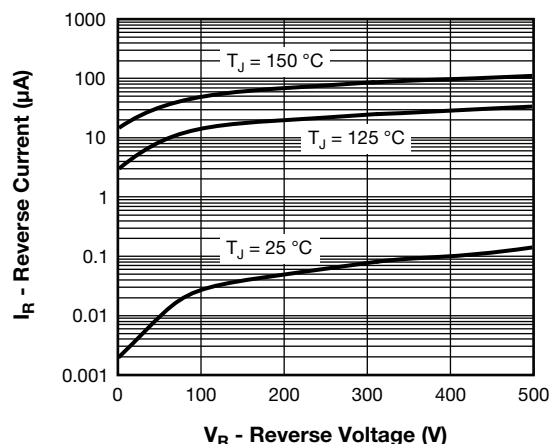


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

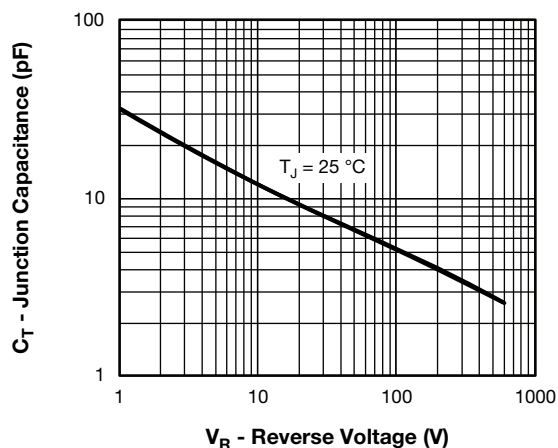


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

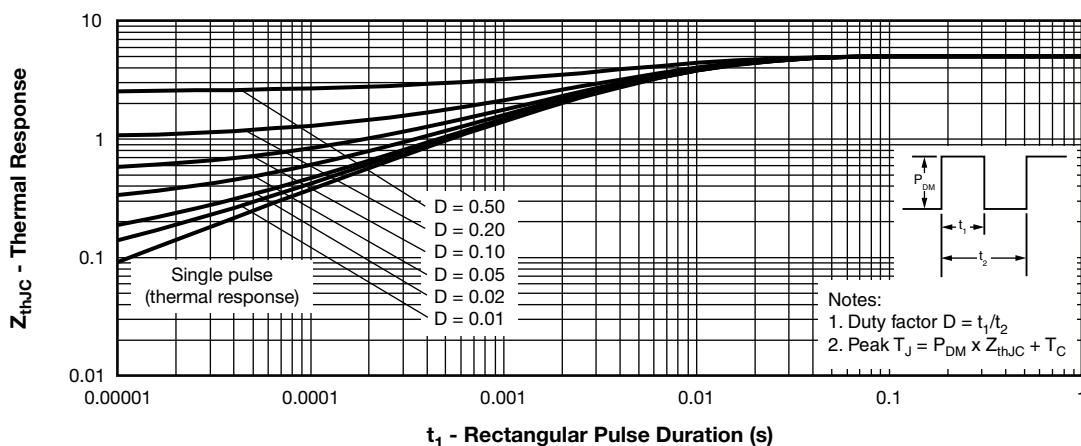
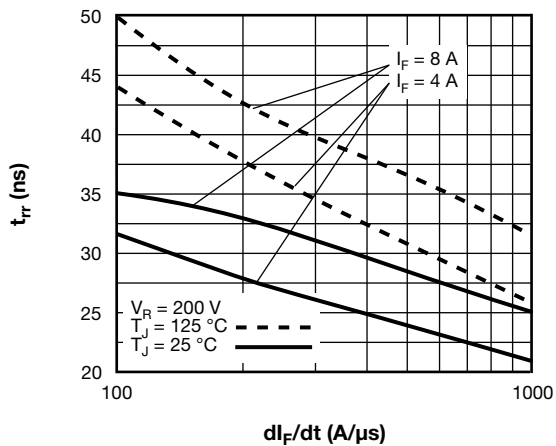
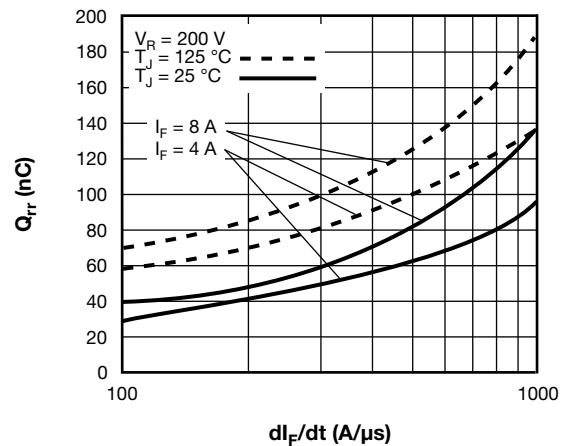
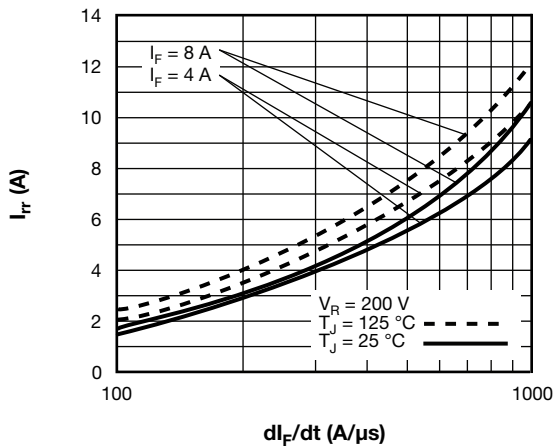
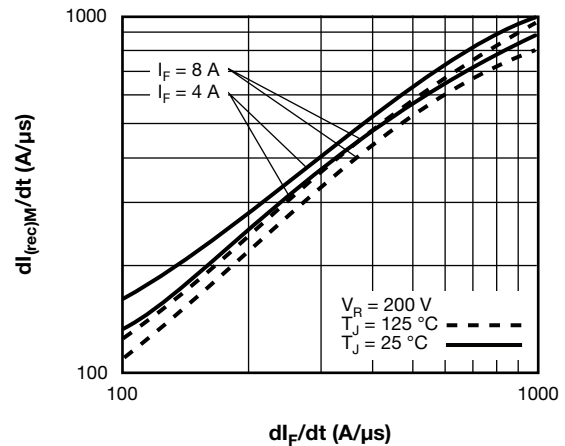


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics


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

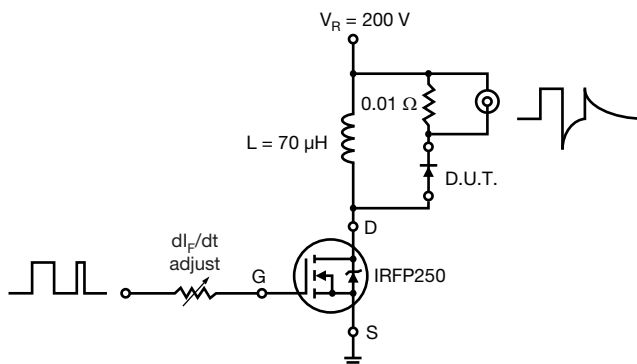
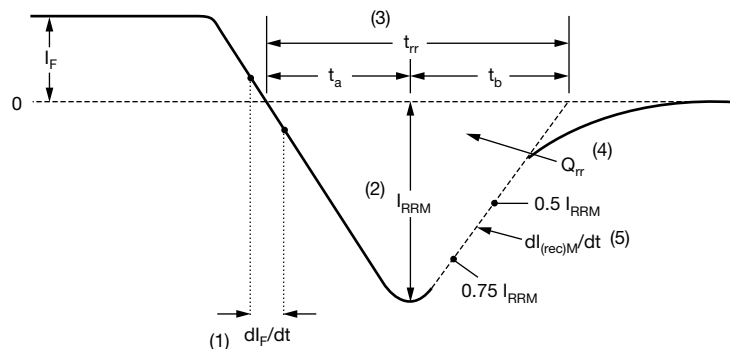


Fig. 9 - Reverse Recovery Parameter Test Circuit



(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 zero crossing point of negative going I_F to point where a line passing through $0.75 I_{RRM}$ and $0.50 I_{RRM}$ extrapolated to zero current.

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

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

Fig. 10 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

Device code	VS-	HF	A	04	TB	60	S	TRL	PbF
	1	2	3	4	5	6	7	8	9

- | | | |
|----------|---|--|
| 1 | - | Vishay Semiconductors product |
| 2 | - | HEXFRED® family |
| 3 | - | Process designator: A = electron irradiated |
| 4 | - | Current rating (04 = 4 A) |
| 5 | - | Package outline (TB = TO-220, 2 leads) |
| 6 | - | Voltage rating (60 = 600 V) |
| 7 | - | S = D ² PAK |
| 8 | - | <ul style="list-style-type: none">• None = tube (50 pieces)• TRL = tape and reel (left oriented)• TRR = tape and reel (right oriented) |
| 9 | - | <ul style="list-style-type: none">• PbF = lead (Pb)-free, for tube packaged• P = lead (Pb)-free, for tape and reel packaged |

ORDERING INFORMATION (Example)

PREFERRED P/N	QUANTITY PER TUBE OR TAPE AND REEL	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-HFA04TB60SPBF	50	1000	Antistatic plastic tube
VS-HFA04TB60STRLP	800	800	13" diameter reel
VS-HFA04TB60STRRP	800	800	13" diameter reel

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?95046
Part marking information	www.vishay.com/doc?95054
Packaging information	www.vishay.com/doc?95032



D²PAK

DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D²PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	0.00	0.254	0.000	0.010	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
H	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	-	1.65	-	0.066	3
L2	1.27	1.78	0.050	0.070	
L3	0.25 BSC		0.010 BSC		
L4	4.78	5.28	0.188	0.208	

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) 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 outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inch
- (7) Outline conforms to JEDEC® outline TO-263AB



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