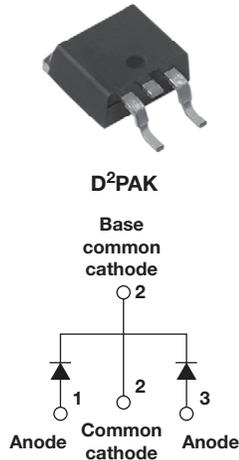


# HEXFRED®

## Ultrafast Soft Recovery Diode, 2 x 4 A



### FEATURES

- Ultrafast and ultrasoft recovery
- Very low  $I_{RRM}$  and  $Q_{rr}$
- Specified at operating conditions
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### BENEFITS

- Reduced RFI and EMI
- Reduced power loss in diode and switching transistor
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

### DESCRIPTION

VS-HFA08TA60CSPbF is a state of the art center tap ultrafast recovery diode. Employing the latest in epitaxial construction and advanced processing techniques it features a superb combination of characteristics which result in performance which is unsurpassed by any rectifier previously available. With basic ratings of 600 V and 4 A per leg continuous current, the VS-HFA08TA60CSPbF is especially well suited for use as the companion diode for IGBTs and MOSFETs. In addition to ultrafast recovery time, the HEXFRED® product line features extremely low values of peak recovery current ( $I_{RRM}$ ) and does not exhibit any tendency to “snap-off” during the  $t_b$  portion of recovery. The HEXFRED features combine to offer designers a rectifier with lower noise and significantly lower switching losses in both the diode and the switching transistor. These HEXFRED advantages can help to significantly reduce snubbing, component count and heatsink sizes. The HEXFRED VS-HFA08TA60CSPbF is ideally suited for applications in power supplies and power conversion systems (such as inverters), motor drives, and many other similar applications where high speed, high efficiency is needed.

### PRODUCT SUMMARY

Package	TO-263AB (D <sup>2</sup> PAK)
$I_{F(AV)}$	8 A
$V_R$	600 V
$V_F$ at $I_F$	2.2 V
$t_{rr}$ (typ.)	17 ns
$T_J$ max.	150 °C
Diode variation	Common cathode

### ABSOLUTE MAXIMUM RATINGS

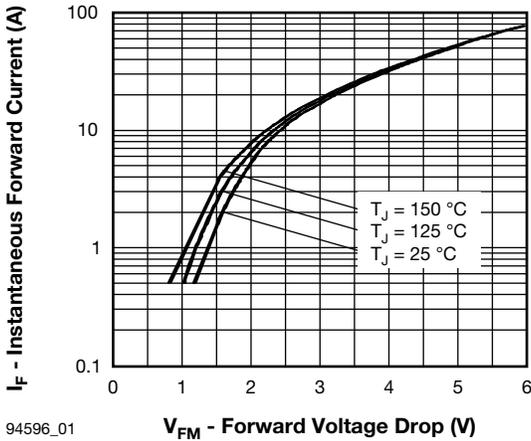
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	$V_R$		600	V
Maximum continuous forward current	$I_F$	$T_C = 100\text{ °C}$	per leg 4	A
			per device 8	
Single pulse forward current	$I_{FSM}$		25	
Maximum repetitive forward current	$I_{FRM}$		16	
Maximum power dissipation	$P_D$	$T_C = 25\text{ °C}$	25	W
		$T_C = 100\text{ °C}$	10	
Operating junction and storage temperature range	$T_J, T_{Stg}$		-55 to +150	°C



<b>ELECTRICAL SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ 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	$V_{FM}$	$I_F = 4.0\text{ A}$	-	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	$I_{RM}$	$V_R = V_R\text{ rated}$	-	0.17	3.0	$\mu\text{A}$
		$T_J = 125\text{ }^\circ\text{C}, V_R = 0.8 \times V_R\text{ rated}$	-	44	300	
Junction capacitance	$C_T$	$V_R = 200\text{ V}$	-	4.0	8.0	pF
Series inductance	$L_S$	Measured lead to lead 5 mm from package body	-	8.0	-	nH

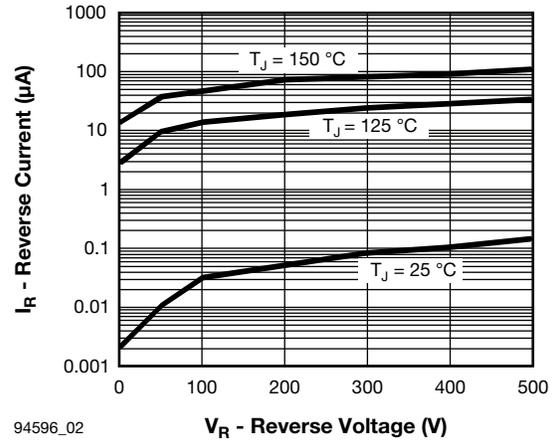
<b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time See fig. 5, 6 and 16	$t_{rr}$	$I_F = 1.0\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	17	-	ns
	$t_{rr1}$	$T_J = 25\text{ }^\circ\text{C}$	-	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	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
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.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style D <sup>2</sup> PAK	HFA08TA60CS			



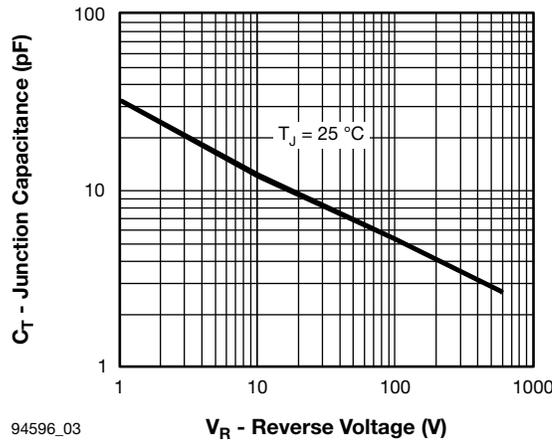
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Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current



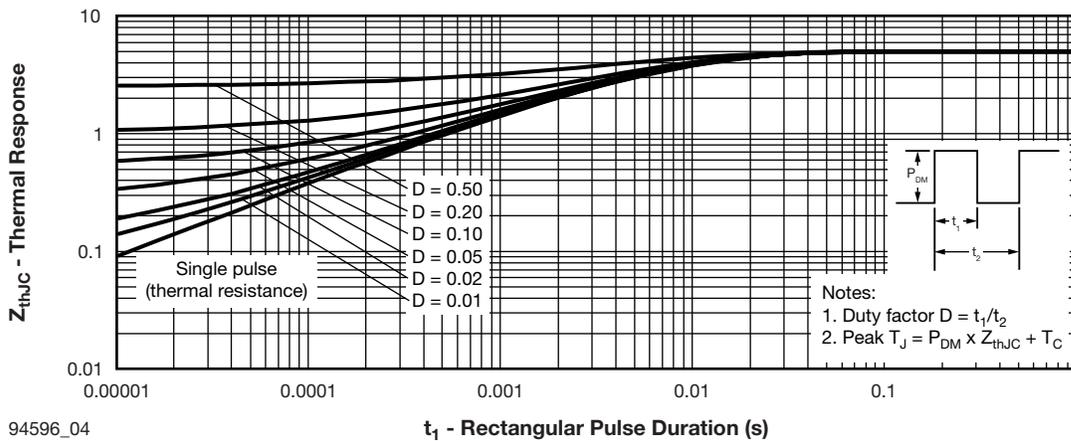
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Fig. 2 - Typical Reverse Current vs. Reverse Voltage



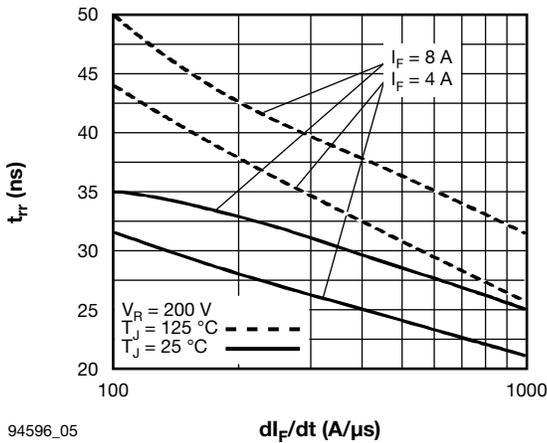
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Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage



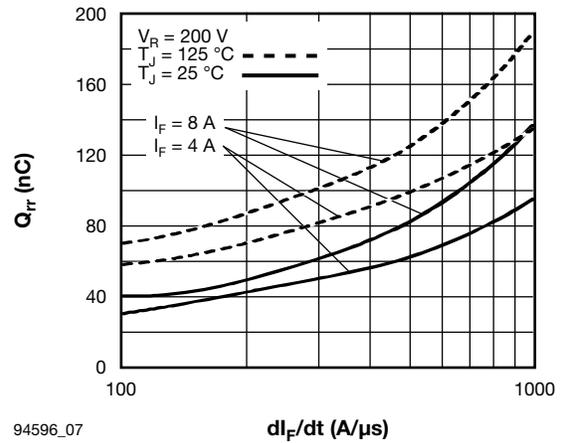
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Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics



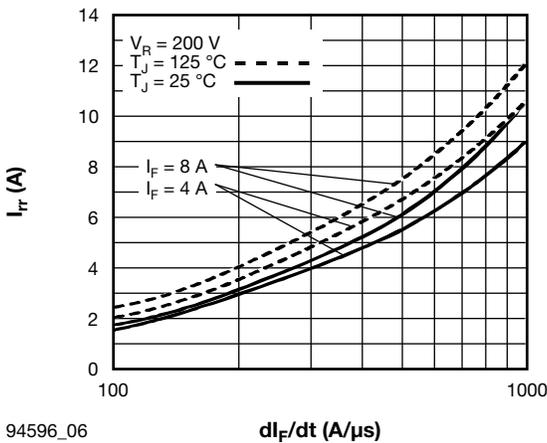
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Fig. 5 - Typical Reverse Recovery Time vs.  $dI_F/dt$



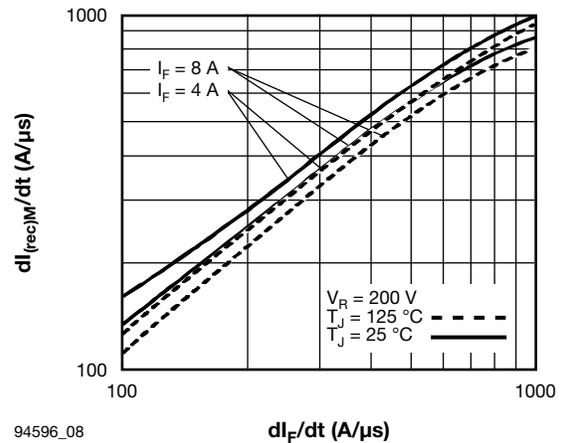
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Fig. 7 - Typical Stored Charge vs.  $dI_F/dt$



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



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

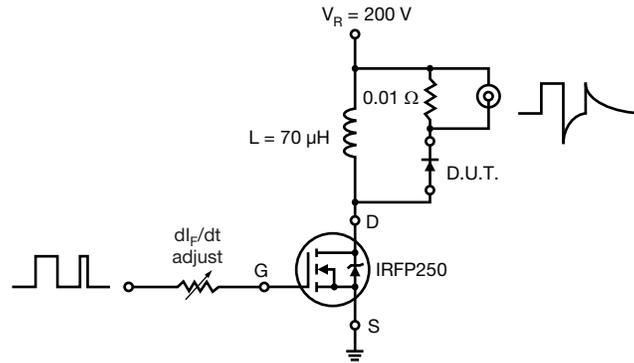


Fig. 9 - Reverse Recovery Parameter Test Circuit

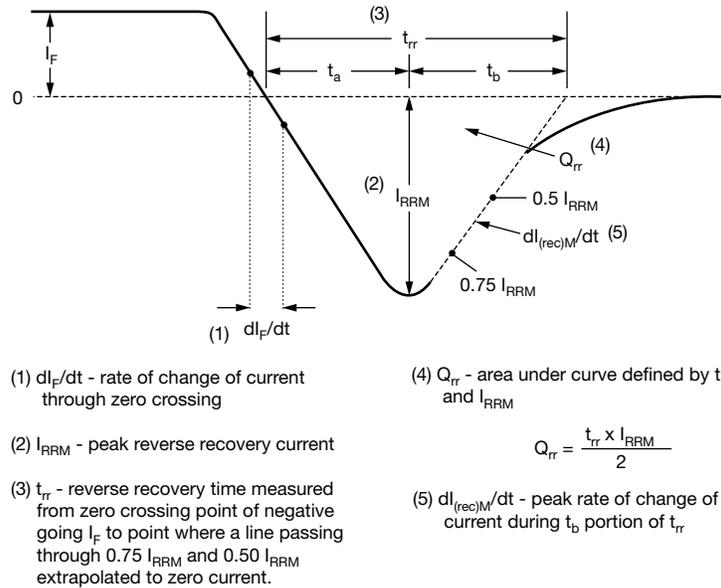
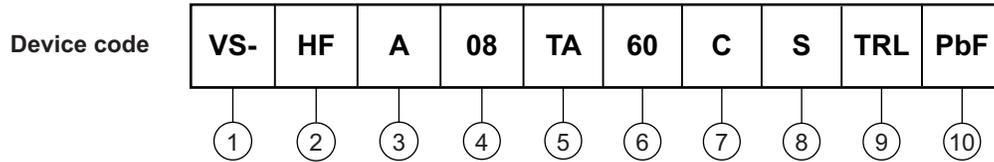


Fig. 10 - Reverse Recovery Waveform and Definitions



## ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - HEXFRED® family
- 3** - Process designator: A = Electron irradiated
- 4** - Current rating (08 = 8 A)
- 5** - Package outline (TA = TO-220, 3 leads)
- 6** - Voltage rating (60 = 600 V)
- 7** - Circuit configuration (C = Common cathode)
- 8** - S = D<sup>2</sup>PAK
- 9** -
  - None = Tube
  - TRL = Tape and reel (left oriented)
  - TRR = Tape and reel (right oriented)
- 10** -
  - PbF = Lead (Pb)-free, for tube packaged
  - P = Lead (Pb)-free, for tape and reel packaged

### LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?95046">www.vishay.com/doc?95046</a>
Part marking information	<a href="http://www.vishay.com/doc?95054">www.vishay.com/doc?95054</a>
Packaging information	<a href="http://www.vishay.com/doc?95032">www.vishay.com/doc?95032</a>

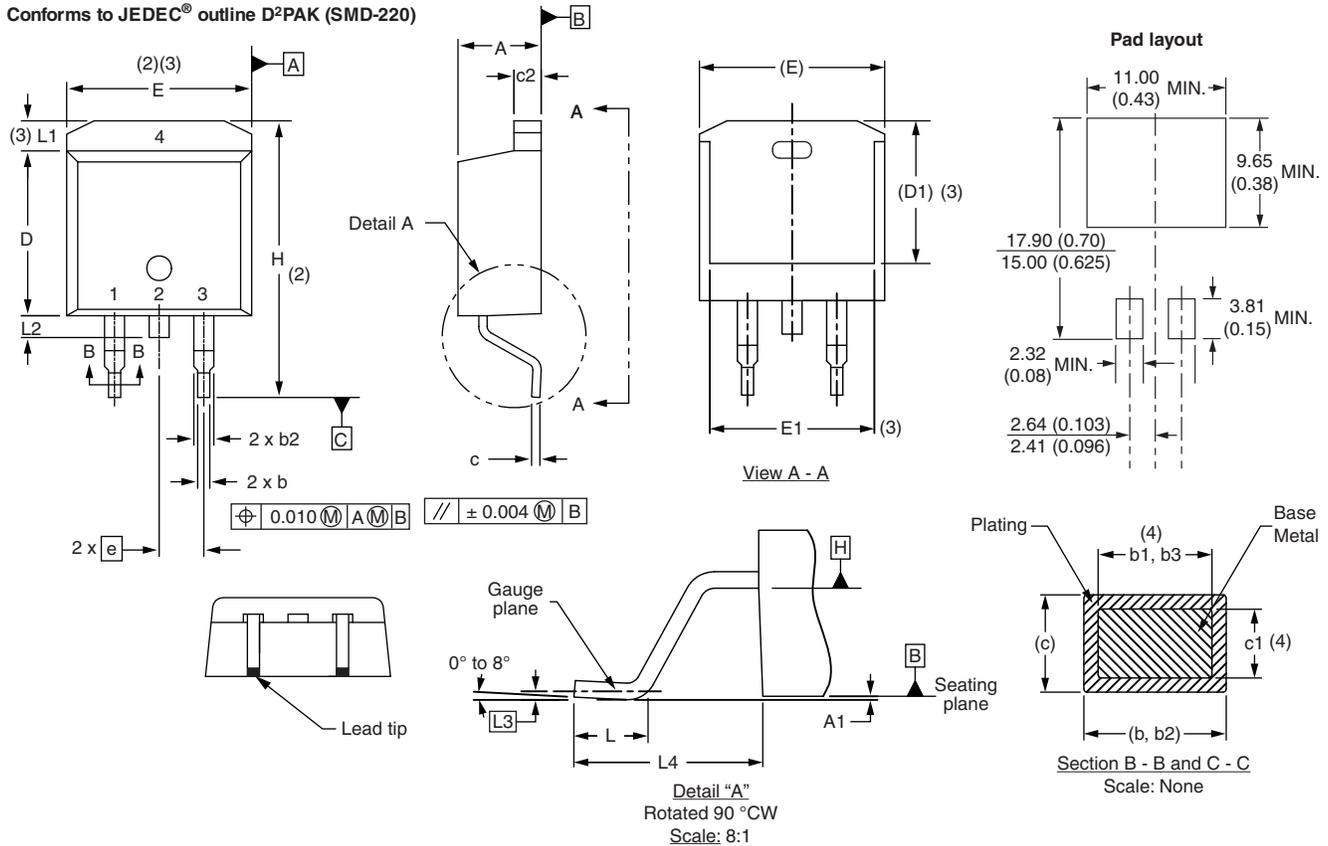
### ORDERING INFORMATION (Example)

PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-HFA08TA60CSPBF	50	1000	Antistatic plastic tube
VS-HFA08TA60CSTRRP	800	800	13" diameter reel
VS-HFA08TA60CSTRLP	800	800	13" diameter reel

### D<sup>2</sup>PAK

#### DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D<sup>2</sup>PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190		D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010		E	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039		E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4	e	2.54 BSC		0.100 BSC		
b2	1.14	1.78	0.045	0.070		H	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4	L	1.78	2.79	0.070	0.110	
c	0.38	0.74	0.015	0.029		L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4	L2	1.27	1.78	0.050	0.070	
c2	1.14	1.65	0.045	0.065		L3	0.25 BSC		0.010 BSC		
D	8.51	9.65	0.335	0.380	2	L4	4.78	5.28	0.188	0.208	

#### Notes

- Dimensioning and tolerancing per ASME Y14.5 M-1994
- 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
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Datum A and B to be determined at datum plane H
- Controlling dimension: inch
- Outline conforms to JEDEC® outline TO-263AB



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