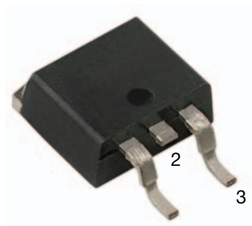
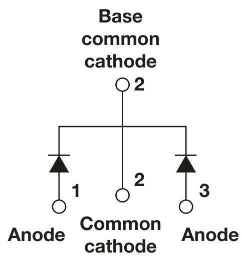
HEXFRED®
Ultrafast Soft Recovery Diode, 2 x 8 A



TO-263AB (D^2PAK)



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

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-HFA16TA60CS 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 8 A per leg continuous current, the VS-HFA16TA60CS 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-HFA16TA60CS 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^2PAK)
$I_{F(AV)}$	2 x 8 A
V_R	600 V
V_F at I_F	1.4 V
t_{rr} typ.	18 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	per leg	I_F	T_C = 100 °C	8	A
	per device			16	
Single pulse forward current		I_{FSM}		60	
Maximum repetitive forward current		I_{FRM}		24	
Maximum power dissipation		P_D	T_C = 25 °C	36	W
			T_C = 100 °C	14	
Operating junction and storage temperature range		T_J, T_{Stg}		-55 to +150	°C

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ELECTRICAL SPECIFICATIONS PER LEG (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Cathode to anode breakdown voltage	V_{BR}	I_R = 100 µA		600	-	-	V
Maximum forward voltage	V_{FM}	I_F = 8.0 A	See fig. 1	-	1.4	1.7	
		I_F = 16 A		-	1.7	2.1	
		I_F = 8.0 A, T_J = 125 °C		-	1.4	1.7	
Maximum reverse leakage current	I_{RM}	V_R = V_R rated	See fig. 2	-	0.3	5.0	µA
		T_J = 125 °C, V_R = 0.8 x V_R rated		-	100	500	
Junction capacitance	C_T	V_R = 200 V	See fig. 3	-	10	25	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body		-	8.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS PER LEG (T_J = 25 °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 A, dI_F/dt = 200 A/µs, V_R = 30 V		-	18	-	ns
	t_{rr1}	T_J = 25 °C	I_F = 8.0 A dI_F/dt = 200 A/µs V_R = 200 V	-	37	55	
	t_{rr2}	T_J = 125 °C		-	55	90	
Peak recovery current See fig. 7 and 8	I_{RRM1}	T_J = 25 °C		-	3.5	5.0	A
	I_{RRM2}	T_J = 125 °C		-	4.5	8.0	
Reverse recovery charge See fig. 9 and 10	Q_{rr1}	T_J = 25 °C		-	65	138	nC
	Q_{rr2}	T_J = 125 °C		-	124	360	
Peak rate of fall of recovery current during t_b See fig. 11 & 12	$dI_{(rec)M}/dt1$	T_J = 25 °C		-	240	-	A/µs
	$dI_{(rec)M}/dt2$	T_J = 125 °C		-	210	-	

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	°C
Junction to case, single leg conducting	R_{thJC}		-	-	3.5	K/W
Junction to case, both legs conducting			-	-	1.75	
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	80	
Weight			-	2	-	g
			-	0.07	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-263AB (D^2PAK)	HFA16TA60CS			

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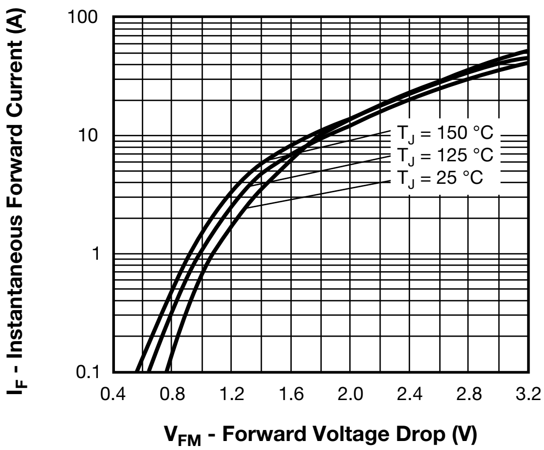

Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

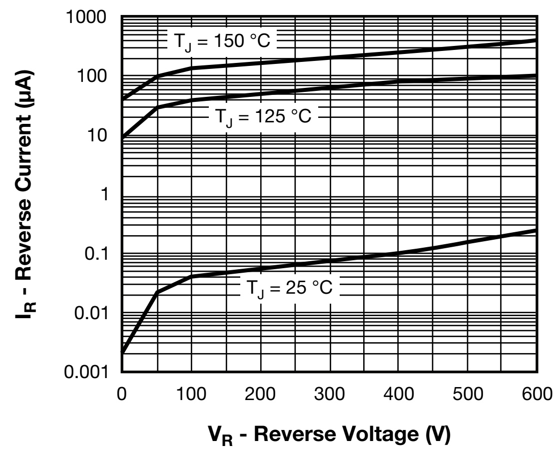

Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

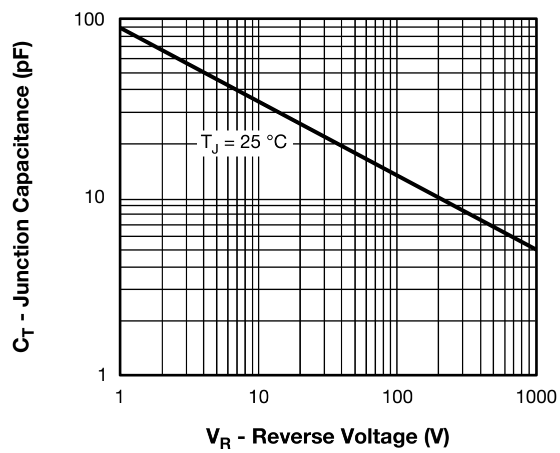

Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

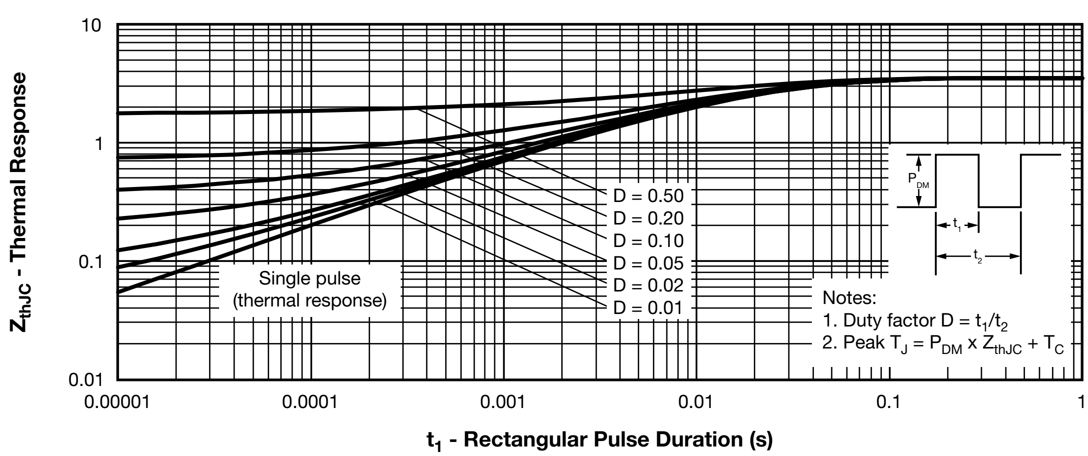

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

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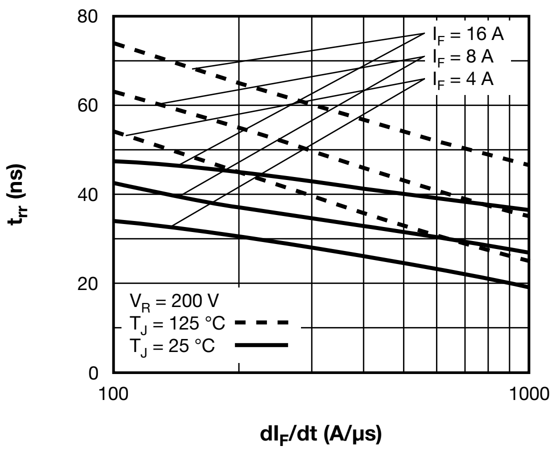

Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt (Per Leg)

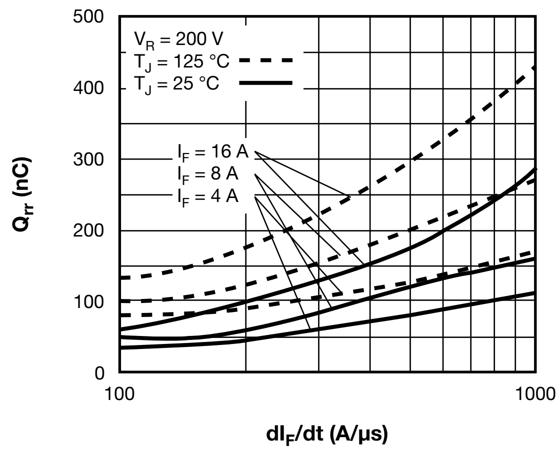

Fig. 7 - Typical Stored Charge vs. dI_F/dt (Per Leg)

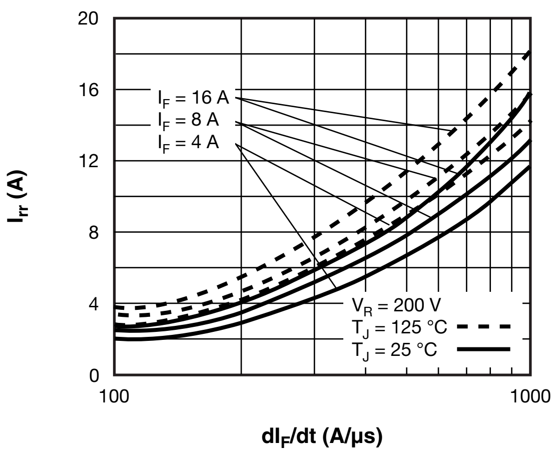

Fig. 6 - Typical Recovery Current vs. dI_F/dt (Per Leg)

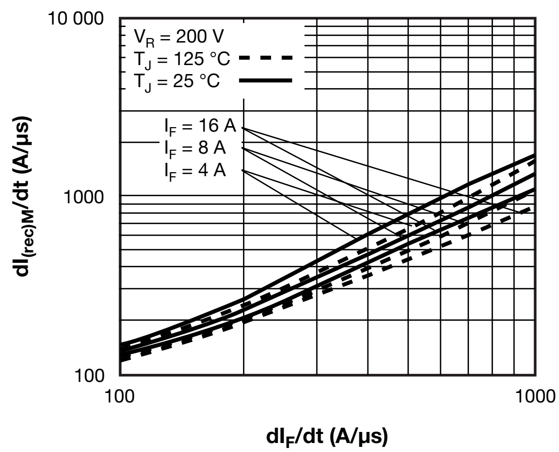

Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt (Per Leg)

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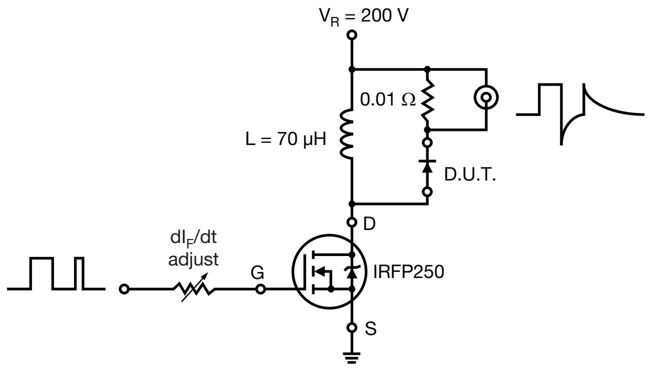
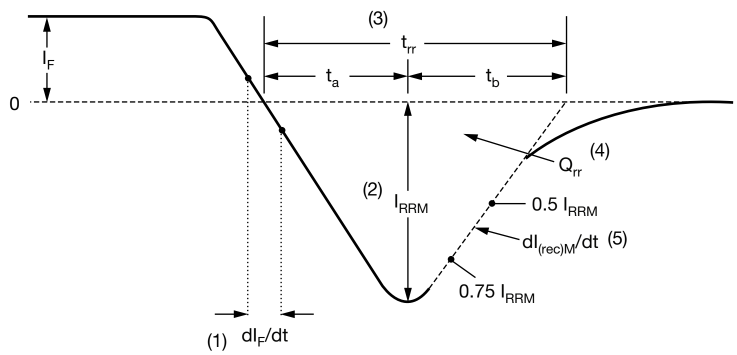


Fig. 9 - Reverse Recovery Parameter Test Circuit



(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

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ORDERING INFORMATION TABLE

Device code	VS-	HF	A	16	TA	60	C	S	TRL	PbF
	1	2	3	4	5	6	7	8	9	10

1 - Vishay Semiconductors product

2 - HEXFRED® family

3 - Process designator: A = electron irradiated

4 - Current rating (16 = 16 A)

5 - Package outline (TA = TO-220, 3 leads)

6 - Voltage rating (60 = 600 V)

7 - Circuit configuration (C = common cathode)

8 - S = D^2PAK

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	www.vishay.com/doc?95046
Part marking information	www.vishay.com/doc?95054
Packaging information	www.vishay.com/doc?95032
SPICE model	www.vishay.com/doc?95689

ORDERING INFORMATION (Example)

PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-HFA16TA60CSPBF	50	1000	Antistatic plastic tube
VS-HFA16TA60CSTRRP	800	800	13" diameter reel
VS-HFA16TA60CSTRLP	800	800	13" diameter reel

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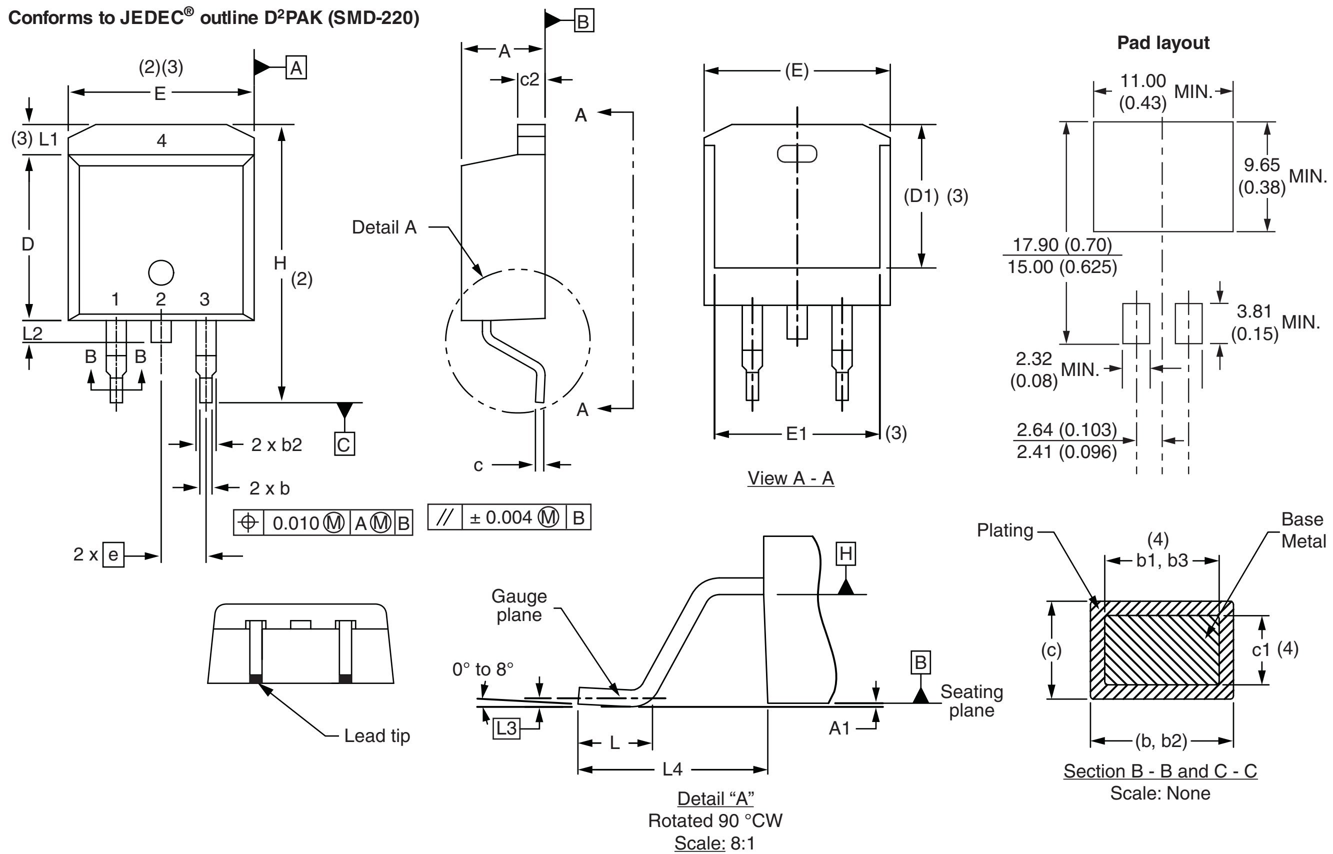
D^2PAK

DIMENSIONS in millimeters and inches



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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