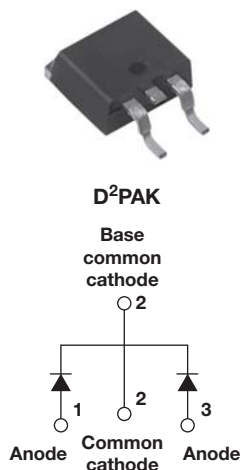


HEXFRED[®], Ultrafast Soft Recovery Diode, 2 x 15 A



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



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-HFA30TA60CS 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 15 A per leg continuous current, the VS-HFA30TA60CS 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-HFA30TA60CS 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 ² PAK)
$I_{F(AV)}$	2 x 15 A
V_R	600 V
V_F at I_F	1.7 V
t_{rr} (typ.)	19 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 per device	I_F	$T_C = 100\text{ °C}$	15 30	A
Single pulse forward current	I_{FSM}		150	
Maximum repetitive forward current	I_{FRM}		60	
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$	74	°C
		$T_C = 100\text{ °C}$	29	
Operating junction and storage temperature range	T_J, T_{Stg}		- 55 to + 150	W

**ELECTRICAL SPECIFICATIONS PER LEG** ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

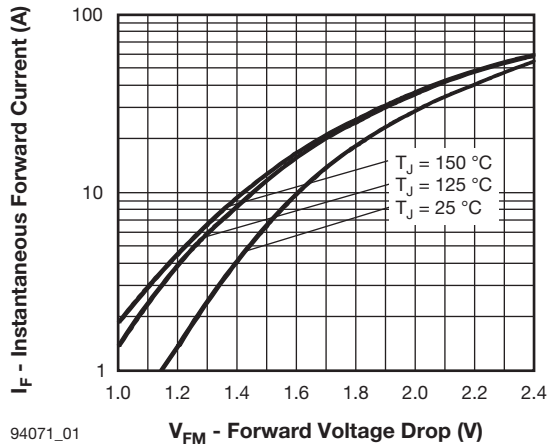
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	V_{BR}	$I_R = 100\text{ }\mu\text{A}$	600	-	-	
Maximum forward voltage	V_{FM}	$I_F = 15\text{ A}$	-	1.3	1.7	V
		$I_F = 30\text{ A}$	-	1.5	2.0	
		$I_F = 15\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$	-	1.2	1.6	
Maximum reverse leakage current	I_{RM}	$V_R = V_R\text{ rated}$	-	1.0	10	μA
		$T_J = 125\text{ }^{\circ}\text{C}, V_R = 0.8 \times V_R\text{ rated}$	-	400	1000	
Junction capacitance	C_T	$V_R = 200\text{ V}$	-	25	50	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS PER LEG ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time See fig. 5, 10	t_{rr}	$I_F = 1.0\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	19	-	ns
	t_{rr1}	$T_J = 25\text{ }^{\circ}\text{C}$	-	42	60	
	t_{rr2}	$T_J = 125\text{ }^{\circ}\text{C}$	-	70	90	
Peak recovery current See fig. 6	I_{RRM1}	$T_J = 25\text{ }^{\circ}\text{C}$	-	4.0	6.0	A
	I_{RRM2}	$T_J = 125\text{ }^{\circ}\text{C}$	-	6.5	10	
Reverse recovery charge See fig. 7	Q_{rr1}	$T_J = 25\text{ }^{\circ}\text{C}$	-	80	180	nC
	Q_{rr2}	$T_J = 125\text{ }^{\circ}\text{C}$	-	220	450	
Peak rate of fall of recovery current during t_b See fig. 8	$dl_{(rec)M}/dt1$	$T_J = 25\text{ }^{\circ}\text{C}$	-	188	-	A/ μs
	$dl_{(rec)M}/dt2$	$T_J = 125\text{ }^{\circ}\text{C}$	-	160	-	

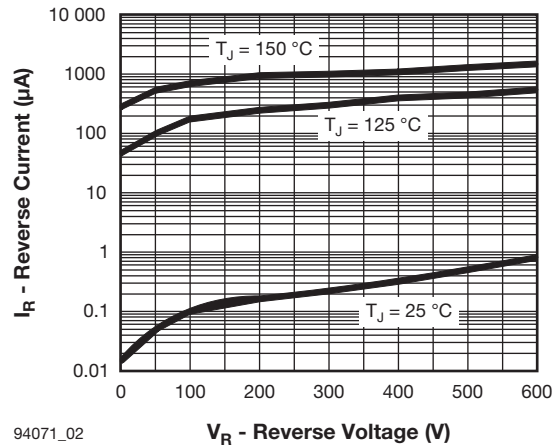
THERMAL - MECHANICAL SPECIFICATIONS PER LEG

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Lead temperature	T_{lead}	0.063" from case (1.6 mm) for 10 s	-	-	300	$^{\circ}\text{C}$
Junction to case, single leg conducting	R_{thJC}		-	-	1.7	K/W
Junction to case, both legs conducting			-	-	0.85	
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 ² PAK	HFA30TA60CS			



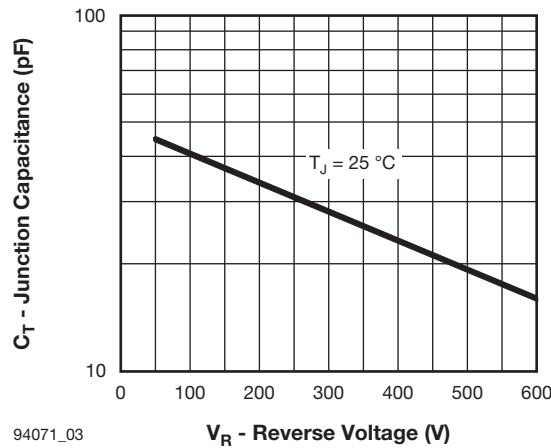
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Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)



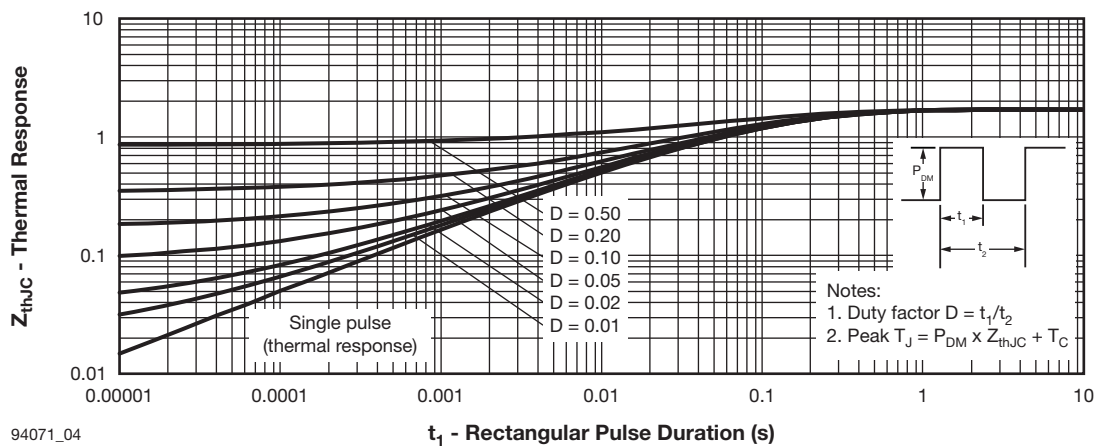
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Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)



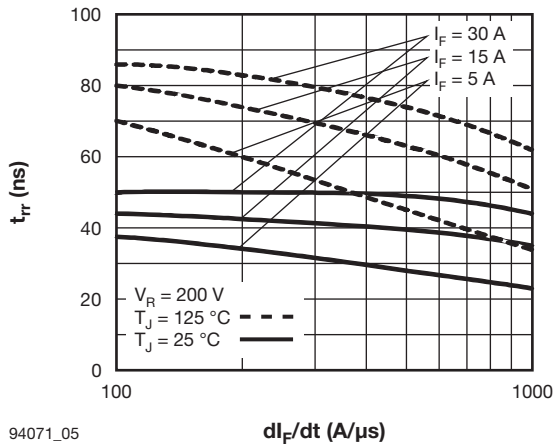
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Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

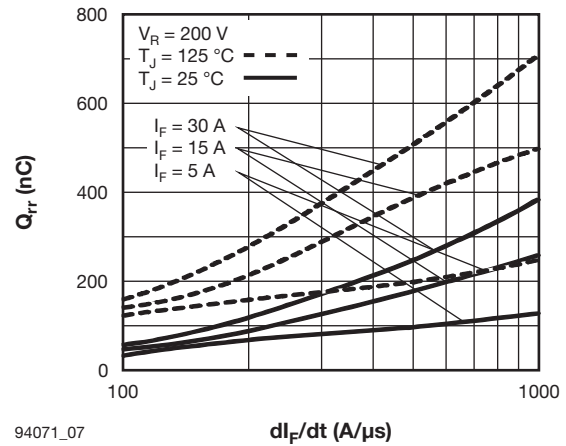


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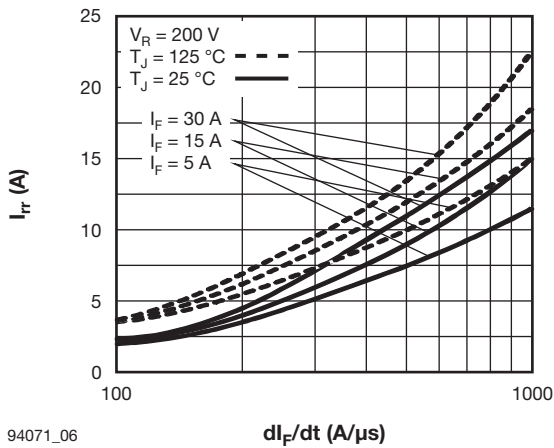
Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)



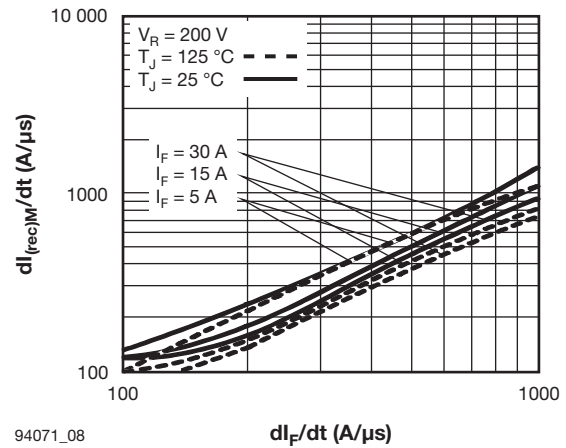
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Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt (Per Leg)


94071_07

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


94071_06

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


94071_08

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

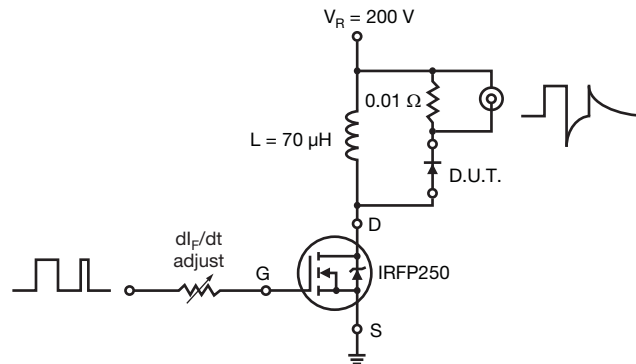


Fig. 9 - Reverse Recovery Parameter Test Circuit

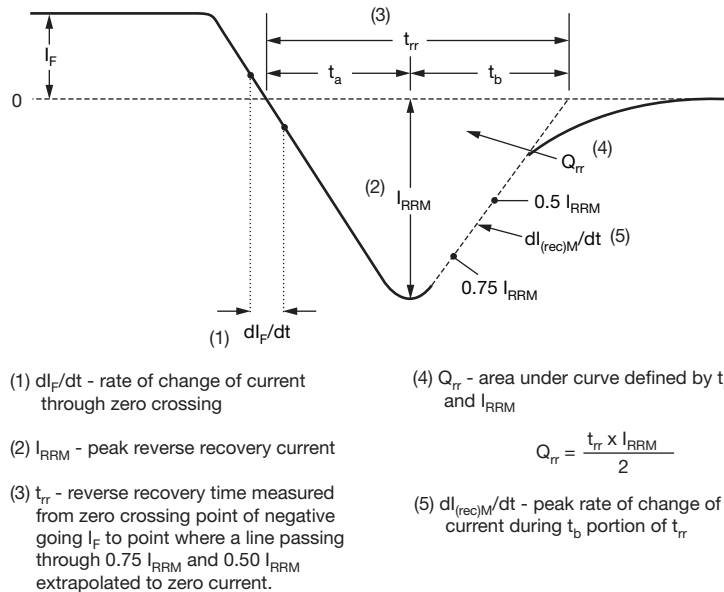


Fig. 10 - Reverse Recovery Waveform and Definitions

**ORDERING INFORMATION TABLE**

Device code	VS-	HF	A	30	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 (30 = 30 A) |
| 5 | - | Package outline (TA = TO-220, 3 leads) |
| 6 | - | Voltage rating (60 = 600 V) |
| 7 | - | Circuit configuration (C = Common cathode) |
| 8 | - | S = D ² PAK |
| 9 | - | <ul style="list-style-type: none">• None = Tube• TRL = Tape and reel (left oriented)• TRR = Tape and reel (right oriented) |
| 10 | - | <ul style="list-style-type: none">• PbF = Lead (Pb)-free• P = Lead (Pb)-free (for D²PAK TRR and TRL) |

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

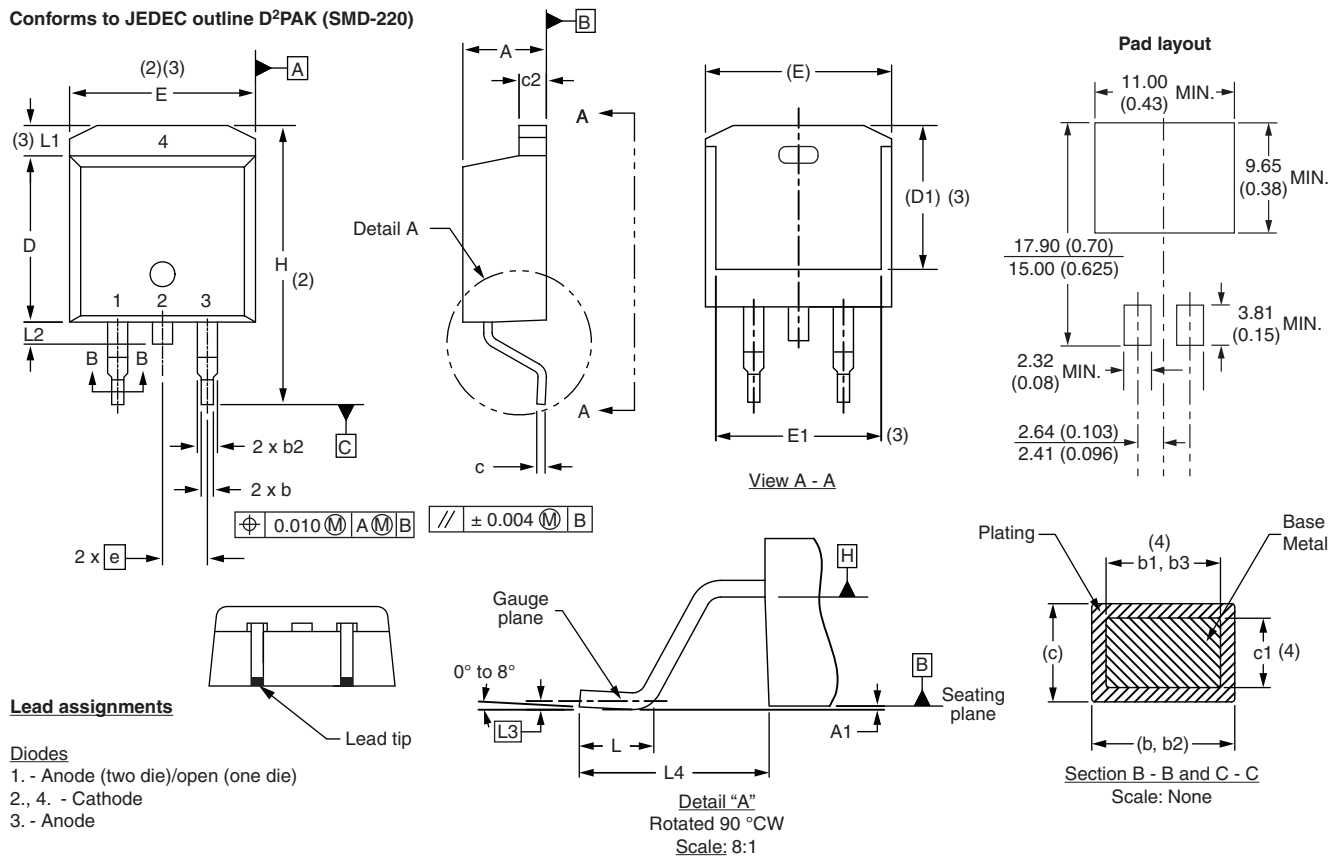
ORDERING INFORMATION (Example)

PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-HFA30TA60CSPBF	50	1000	Antistatic plastic tube
VS-HFA30TA60CSTRRP	800	800	13" diameter reel
VS-HFA30TA60CSTRLP	800	800	13" diameter reel

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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