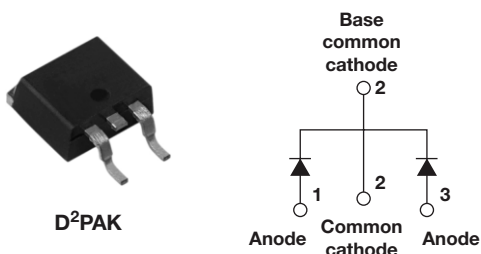


HEXFRED®

Ultrafast Soft Recovery Diode, 2 x 15 A



FEATURES

- Ultrafast recovery
- Ultrasoft recovery
- Very low I_{RRM}
- Very low Q_{rr}
- Specified at operating conditions
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Halogen-free according to IEC 61249-2-21 definition
- Compliant to RoHS directive 2002/95/EC
- AEC-Q101 qualified



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

V_R	600 V
V_F at 15 A at 25 °C	1.7 V
$I_{F(AV)}$	2 x 15 A
t_{rr} (typical)	19 ns
T_J (maximum)	150 °C
Q_{rr} (typical)	80 nC
$di_{(rec)M}/dt$ (typical) at 125 °C	160 A/μs
I_{RRM} (typical)	4.0 A

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 °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 = 15 A	See fig. 1	-	1.3	1.7	
		I _F = 30 A		-	1.5	2.0	
		I _F = 15 A, T _J = 125 °C		-	1.2	1.6	
Maximum reverse leakage current	I _{RM}	V _R = V _R rated	See fig. 2	-	1.0	10	μA
		T _J = 125 °C, V _R = 0.8 x V _R rated		-	400	1000	
Junction capacitance	C _T	V _R = 200 V	See fig. 3	-	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 °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 A, dI _F /dt = 200 A/μs, V _R = 30 V		-	19	-	ns
	t _{rr1}	T _J = 25 °C	I _F = 15 A dI _F /dt = 200 A/μs V _R = 200 V	-	42	60	
	t _{rr2}	T _J = 125 °C		-	70	90	
Peak recovery current See fig. 6	I _{RRM1}	T _J = 25 °C		-	4.0	6.0	A
	I _{RRM2}	T _J = 125 °C		-	6.5	10	
Reverse recovery charge See fig. 7	Q _{rr1}	T _J = 25 °C		-	80	180	nC
	Q _{rr2}	T _J = 125 °C		-	220	450	
Peak rate of fall of recovery current during t _b See fig. 8	dI _{(rec)M} /dt1	T _J = 25 °C		-	188	-	A/μs
	dI _{(rec)M} /dt2	T _J = 125 °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	°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			

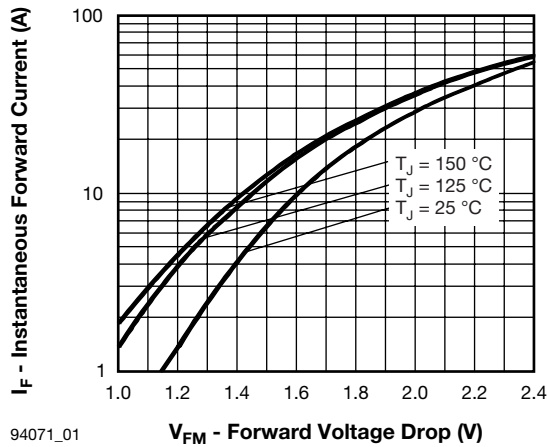


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

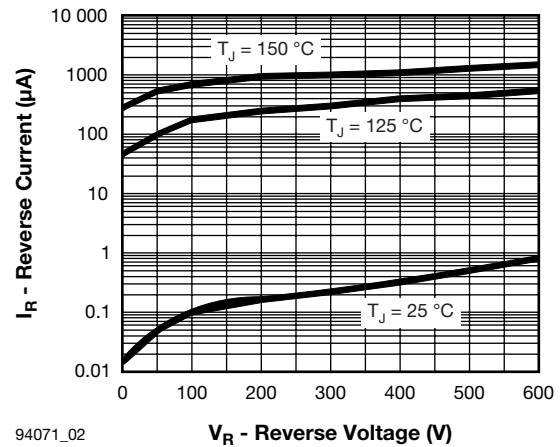


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

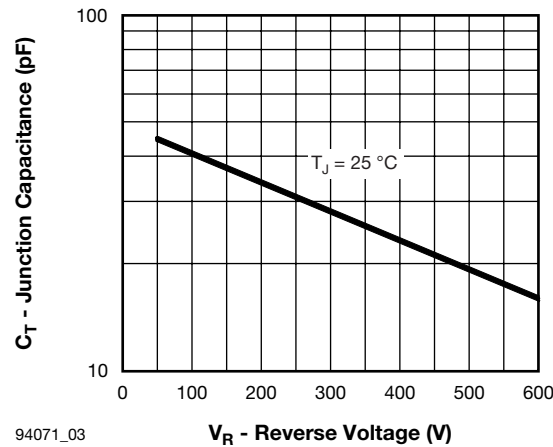


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

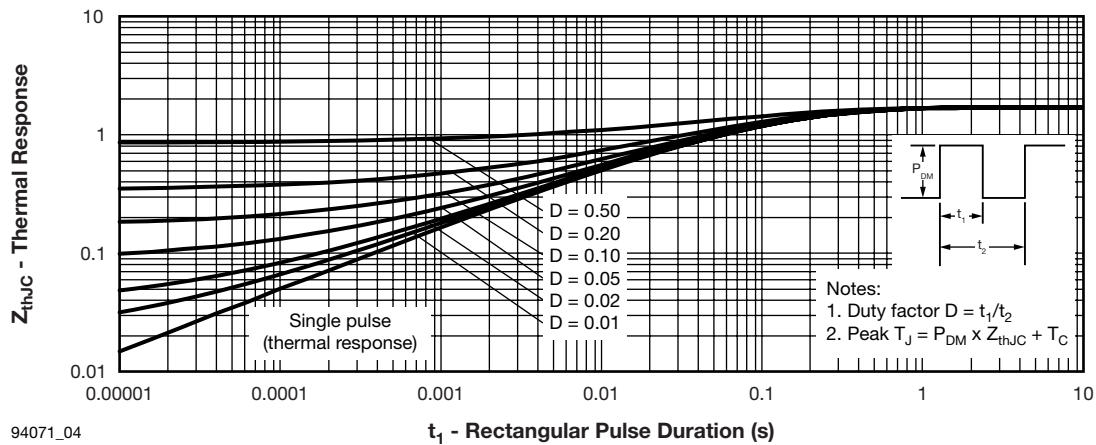
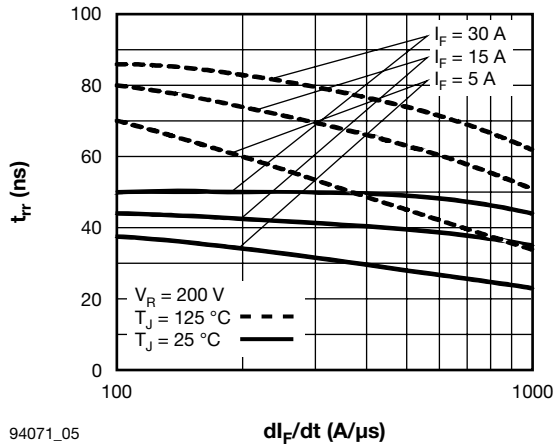
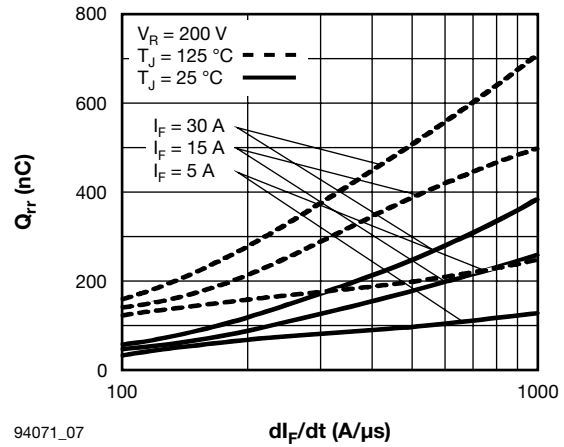


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)



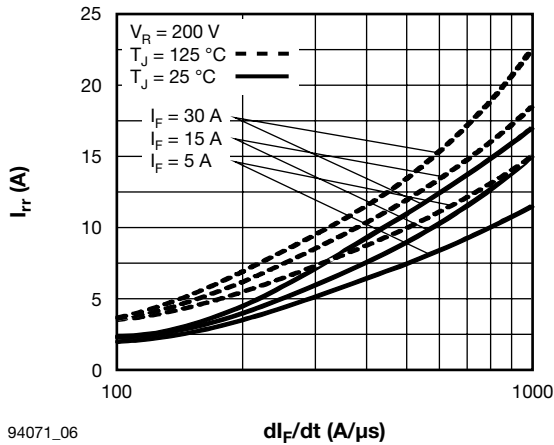
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Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt (Per Leg)



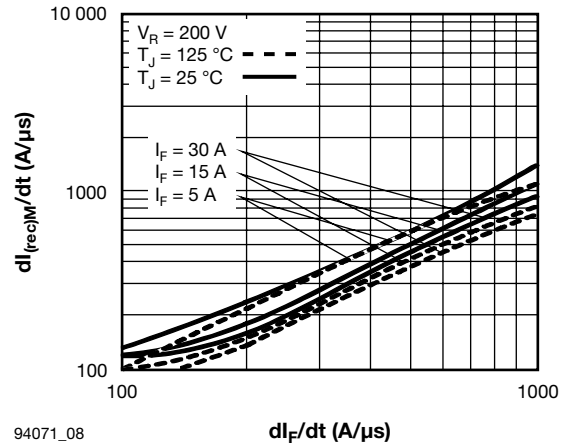
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Fig. 7 - Typical Stored Charge vs. dI_F/dt (Per Leg)



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



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

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Vishay High Power Products

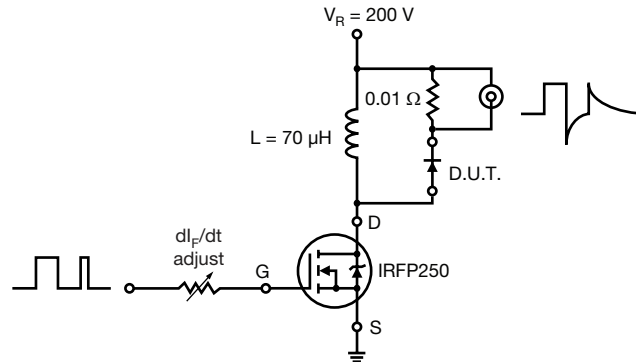


Fig. 9 - Reverse Recovery Parameter Test Circuit

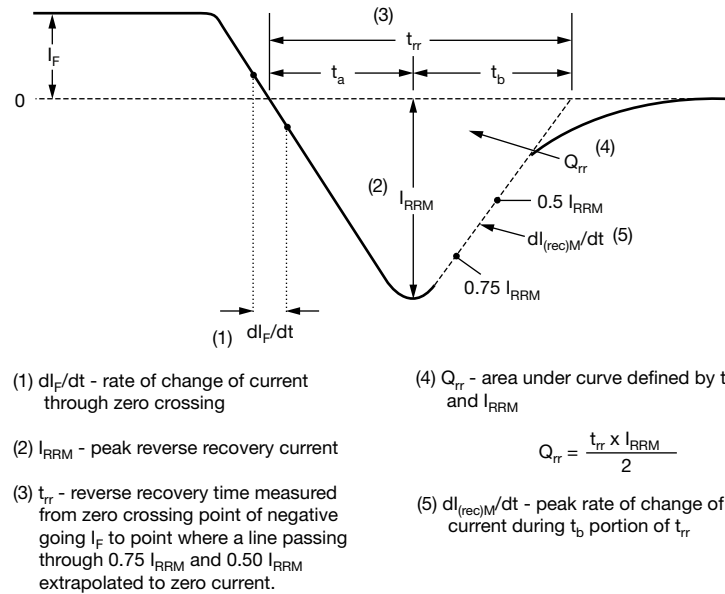


Fig. 10 - Reverse Recovery Waveform and Definitions

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

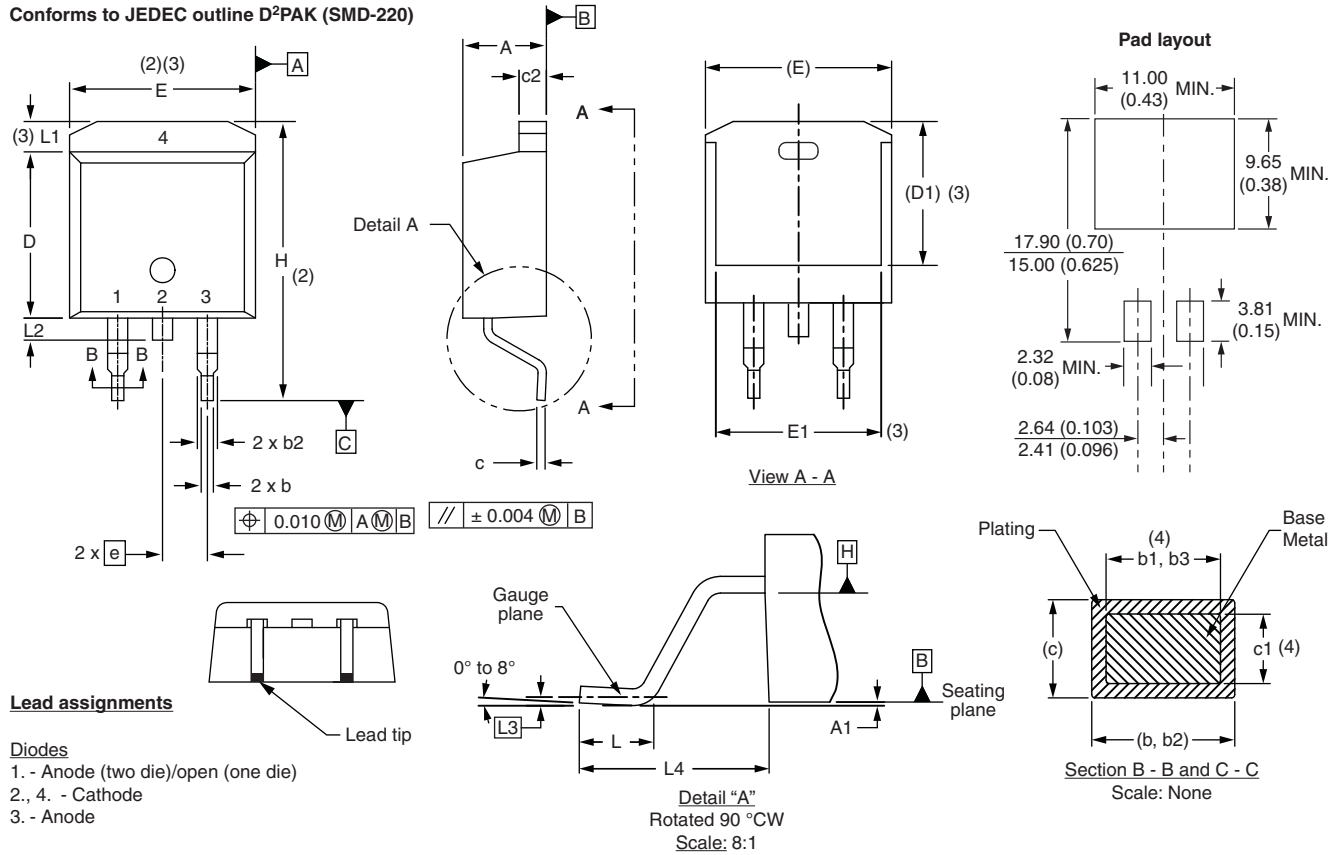
- 1** - HPP product suffix
- 2** - HEXFRED® family
- 3** - Process designator: A = Electron irradiated
- 4** - Current rating (30 = 30 A)
- 5** - Package outline (TA = TO-220, 3 leads)
- 6** - Voltage rating (60 = 600 V)
- 7** - Circuit configuration (C = Common cathode)
- 8** - S = D²PAK
- 9** -
 - None = Tube (50 pieces)
 - TRL = Tape and reel (left oriented)
 - TRR = Tape and reel (right oriented)
- 10** - PbF = Lead (Pb)-free

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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