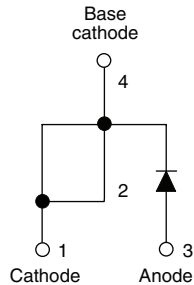


HEXFRED® Ultrafast Soft Recovery Diode, 4 A



TO-220AC

FEATURES

- Ultrafast recovery
- Ultrasoft recovery
- Very low I_{RRM}
- Very low Q_{rr}
- Specified at operating temperature
- Lead (Pb)-free
- Designed and qualified for industrial level



RoHS*
COMPLIANT

BENEFITS

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

DESCRIPTION

HFA04TB60 is a state of the art 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 continuous current, the HFA04TB60 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 HFA04TB60 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 4 A at 25 °C	1.8 V
$I_{F(AV)}$	4 A
t_{rr} (typical)	17 ns
T_J (maximum)	150 °C
Q_{rr}	40 nC
$di_{(rec)M}/dt$	280 A/μs

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		600	V
Maximum continuous forward current	I_F	$T_C = 100\text{ °C}$	4	A
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

* Pb containing terminations are not RoHS compliant, exemptions may apply

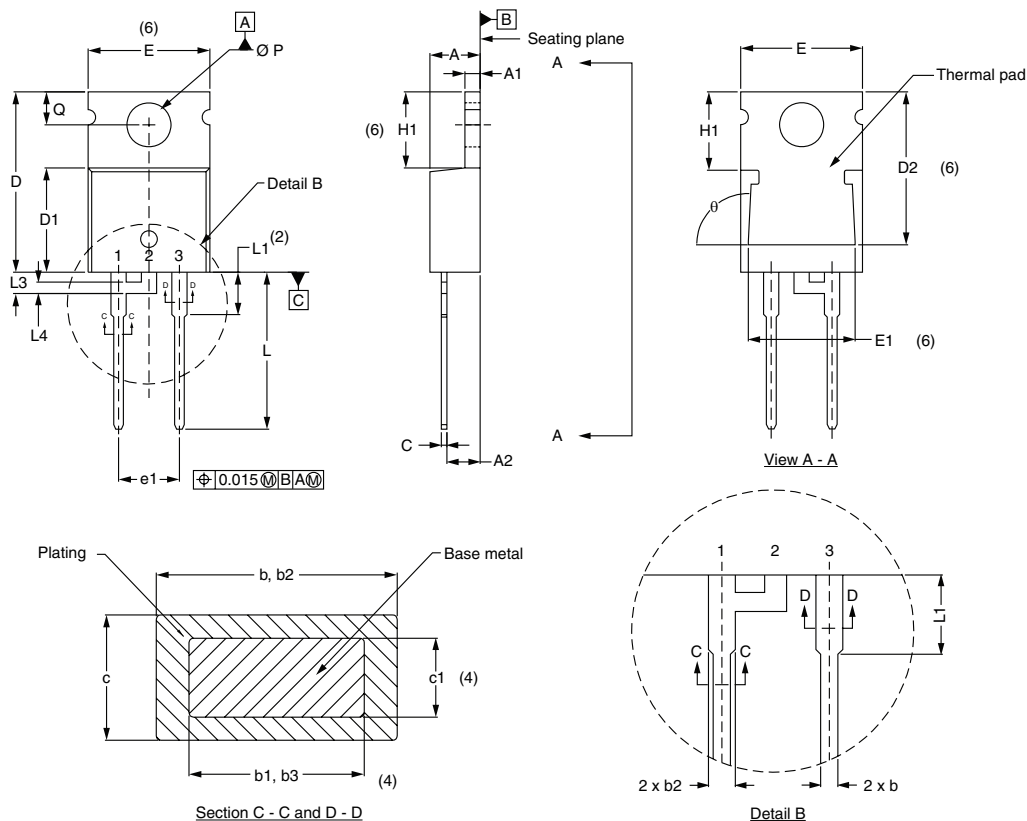
ELECTRICAL SPECIFICATIONS (T _J = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	V _{BR}	I _R = 100 μA		600	-	-	V
Maximum forward voltage	V _{FM}	I _F = 4.0 A	See fig. 1	-	1.5	1.8	
		I _F = 8.0 A		-	1.8	2.2	
		I _F = 4.0 A, T _J = 125 °C		-	1.4	1.7	
Maximum reverse leakage current	I _{RM}	V _R = V _R rated	See fig. 2	-	0.17	3.0	μA
		T _J = 125 °C, V _R = 0.8 x V _R rated		-	44	300	
Junction capacitance	C _T	V _R = 200 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 °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		-	17	-	ns
	t _{rr1}	T _J = 25 °C	I _F = 4 A dI _F /dt = 200 A/μs V _R = 200 V	-	28	42	
	t _{rr2}	T _J = 125 °C		-	38	57	
Peak recovery current See fig. 7 and 8	I _{RRM1}	T _J = 25 °C		-	2.9	5.2	A
	I _{RRM2}	T _J = 125 °C		-	3.7	6.7	
Reverse recovery charge See fig. 9 and 10	Q _{rr1}	T _J = 25 °C		-	40	60	nC
	Q _{rr2}	T _J = 125 °C		-	70	105	
Peak rate of fall of recovery current during t _b See fig. 11 and 12	dl _{(rec)M} /dt1	T _J = 25 °C		-	280	-	A/μs
	dl _{(rec)M} /dt2	T _J = 125 °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	°C
Thermal resistance, junction to case	R _{thJC}		-	-	5.0	K/W
Thermal resistance, junction to ambient	R _{thA}	Typical socket mount	-	-	80	
Thermal resistance, case to heatsink	R _{thS}	Mounting surface, flat, smooth and greased	-	0.5	-	
Weight			-	2.0	-	g
			-	0.07	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-220AC	HFA04TB60			

TO-220AC

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.82	0.140	0.190	
A1	0.51	1.40	0.020	0.055	
A2	2.04	2.92	0.080	0.115	
b	0.38	1.01	0.015	0.040	
b1	0.38	0.96	0.015	0.038	4
b2	1.15	1.77	0.045	0.070	
b3	1.15	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.22	15.87	0.560	0.625	3
D1	8.38	9.02	0.330	0.355	
D2	12.19	12.88	0.480	0.507	6

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
E	9.66	10.66	0.380	0.420	3, 6
E1	8.38	8.89	0.330	0.350	6
e	2.54 BSC		0.100 BSC		
e1	5.08 BSC		0.200 BSC		
H1	5.85	6.86	0.230	0.270	6
L	12.70	14.73	0.500	0.580	
L1	-	6.35	-	0.250	2
L3	1.78	2.13	0.070	0.084	
L4	0.76	1.27	0.030	0.050	
Ø P	3.54	3.73	0.139	0.147	
Q	2.54	3.05	0.100	0.120	
θ	90° to 93°		90° to 93°		

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) 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 outermost extremes of the plastic body
- (4) Dimension b1, b3 and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2 and E1
- (7) Outline conforms are derived from the actual package outline