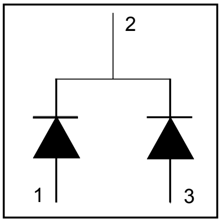
Bulletin PD -20373 01/01

International
IOR Rectifier

HFA16TA60CS

HEXFRED™

Ultrafast, Soft Recovery Diode



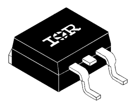
V_R = 600V

V_F = 1.7V

Q_{rr} * = 65nC

$di_{(rec)M}/dt$ * = 240A/µs

* 125°C



D²Pak

Features

- Ultrafast Recovery
- Ultrasoft Recovery
- Very Low I_{RRM}
- Very Low Q_{rr}
- Specified at Operating Conditions

Benefits

- Reduced RFI and EMI
- Reduced Power Loss in Diode and Switching Transistor
- Higher Frequency Operation
- Reduced Snubbing
- Reduced Parts Count

Description

International Rectifier's HFA16TA60CS is a state of the art center tap ultra fast 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 volts and 8 amps per Leg continuous current, the HFA16TA60CS is especially well suited for use as the companion diode for IGBTs and MOSFETs. In addition to ultra fast 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 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.

Absolute Maximum Ratings (per Leg)

	Parameter	Max	Units
V_R	Cathode-to-Anode Voltage	600	V
I_F @ T_C = 100°C	Continuous Forward Current	8.0	A
I_{FSM}	Single Pulse Forward Current	60	
I_{FRM}	Maximum Repetitive Forward Current	24	
P_D @ T_C = 25°C	Maximum Power Dissipation	36	W
P_D @ T_C = 100°C	Maximum Power Dissipation	14	
T_J	Operating Junction and	- 55 to +150	°C
T_{STG}	Storage Temperature Range		

Electrical Characteristics (per Leg) @ T_J = 25°C (unless otherwise specified)

	Parameter	Min	Typ	Max	Units	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	600			V	I_R = 100μA
V_{FM}	Max Forward Voltage		1.4	1.7	V	I_F = 8A See Fig. 1
			1.7	2.1		I_F = 16A
			1.4	1.7		I_F = 8A, T_J = 125°C
I_{RM}	Max Reverse Leakage Current		0.3	5	μA	V_R = V_R Rated See Fig. 2
			100	500		T_J = 125°C, V_R = 0.8 x V_R Rated
C_T	Junction Capacitance		10	25	pF	V_R = 200V See Fig. 3
L_S	Series Inductance		8.0		nH	Measured lead to lead 5mm from package body

Dynamic Recovery Characteristics (per Leg) @ T_J = 25°C (unless otherwise specified)

	Parameter	Min	Typ	Max	Units	Test Conditions	
t_{rr}	Reverse Recovery Time		18		ns	I_F = 1.0A, di_f/dt = 200A/μs, V_R = 30V	
t_{rr1}	See Fig. 5, 6 & 16		37	55		T_J = 25°C	I_F = 8A
t_{rr2}			55	90		T_J = 125°C	
I_{RRM1}	Peak Recovery Current		3.5	5.0	A	T_J = 25°C	
I_{RRM2}	See Fig. 7& 8		4.5	8.0		T_J = 125°C	V_R = 200V
Q_{rr1}	Reverse Recovery Charge		65	138	nC	T_J = 25°C	
Q_{rr2}	See Fig. 9 & 10		124	360		T_J = 125°C	di_f/dt = 200A/μs
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current		240		A/μs	T_J = 25°C	
$di_{(rec)M}/dt2$	During t_b See Fig. 11 & 12		210			T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameter	Min	Typ	Max	Units
T_{lead}①	Lead Temperature			300	°C
R_{thJC}	Junction-to-Case, Single Leg Conducting			3.5	K/W
	Junction-to-Case, Both Legs Conducting			1.75	
R_{thJA}②	Thermal Resistance, Junction to Ambient			80	
Wt	Weight		2		g
			0.07		(oz)
	Mounting Torque	6		12	Kg-cm
		5		10	lbf•in

① 0.063 in. from Case (1.6mm) for 10 sec
② Typical Socket Mount

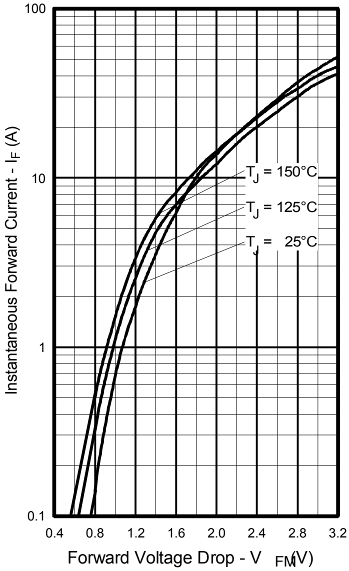


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current, (per Leg)

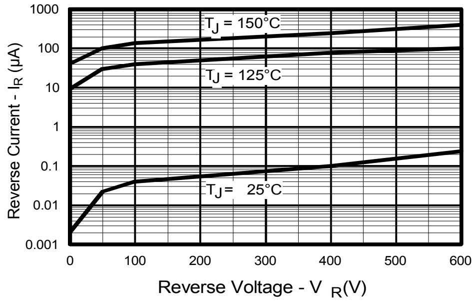


Fig. 2 - Typical Reverse Current vs. Reverse Voltage, (per Leg)

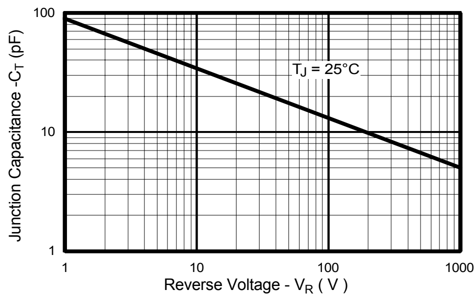


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, (per Leg)

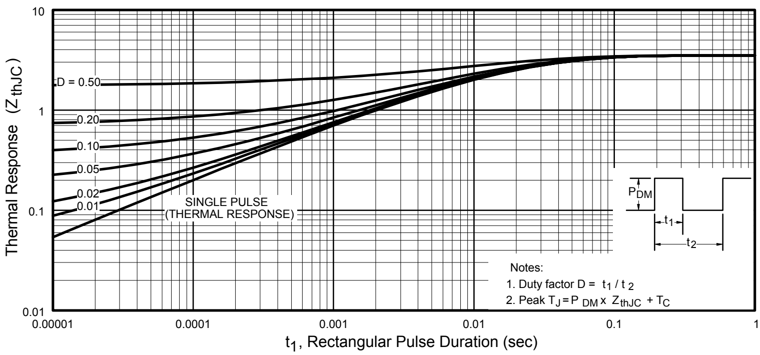


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics, (per Leg)

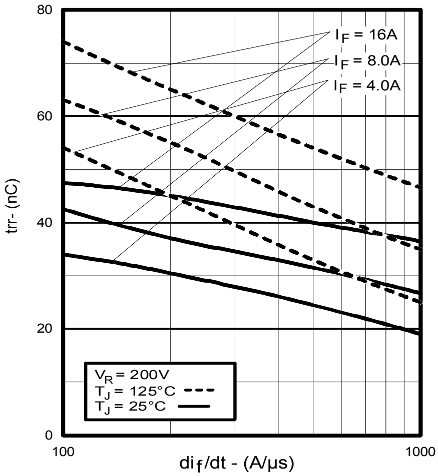


Fig. 5 - Typical Reverse Recovery vs. di_f/dt, (per Leg)

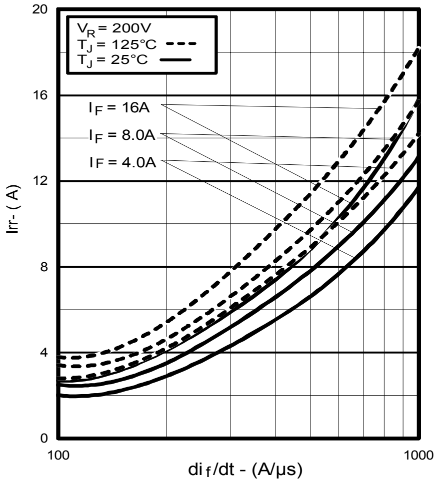


Fig. 6 - Typical Recovery Current vs. di_f/dt, (per Leg)

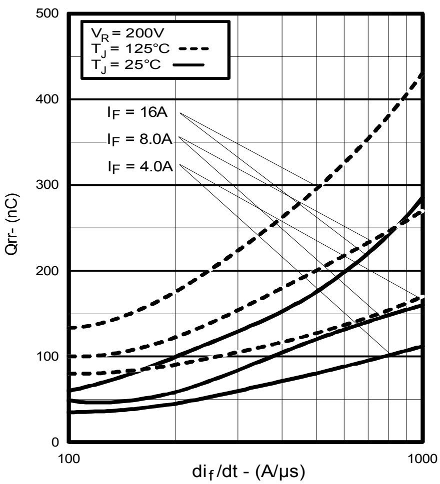


Fig. 7 - Typical Stored Charge vs. di_f/dt, (per Leg)

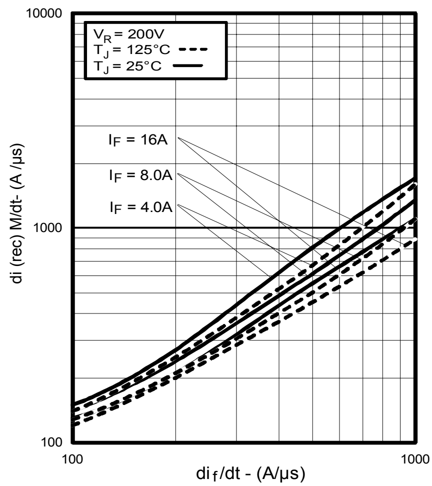


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt, (per Leg)

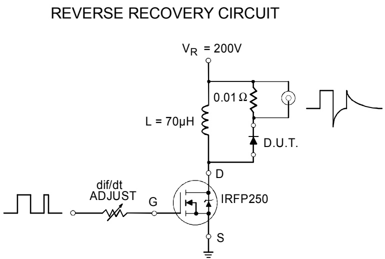
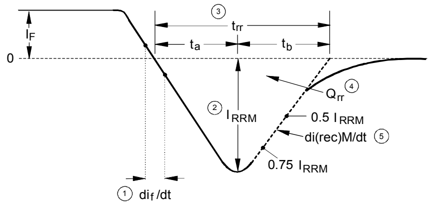


Fig. 9 - Reverse Recovery Parameter Test Circuit

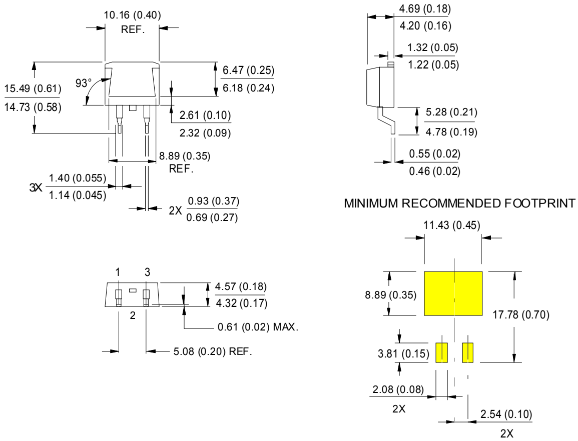


1. di_f/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. trr - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr} - Area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \text{ X } I_{RRM}}{2}$$

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



Conforms to JEDEC Outline D^{2}PAK
Dimensions in millimeters and inches

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