Bulletin PD-20617 rev. B 07/02

International Rectifier

HFA04SD60S

Ultrafast, Soft Recovery Diode

t_{rr} = 38ns
$I_{F(AV)}$ = 4Amp
V_R = 600V

Features

- Ultrafast Recovery Time
- Ultrasoft Recovery
- Very Low I_{RRM}
- Very Low Q_{rr}
- Guaranteed Avalanche
- Specified at Operating Temperature

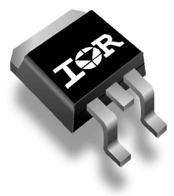
Benefits

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

Description/ Applications

These diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for freewheeling, flyback, power converters, motor drives, and other applications where high speed and reduced switching losses are design requirements.

Package Outline



D - PAK

Absolute Maximum Ratings

	Parameters	Max	Units
V_{RRM}	Cathode-to-Anode Voltage	600	V
$I_{F(AV)}$	Continuous Forward Current T_C = 100°C	4	A
I_{FSM}	Single Pulse Forward Current	25	
I_{FRM}	Peak Repetitive Forward Current T_C = 116°C	16	
P_D	Maximum Power Dissipation T_C = 100°C	10	W
T_J, T_{STG}	Operating Junction and Storage Temperatures	- 55 to 150	°C

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

	Parameters	Min	Typ	Max	Units	Test Conditions
V_{BR}, V_r	Breakdown Voltage, Blocking Voltage	600	-	-	V	I_R = 100µA
V_F	Forward Voltage	-	1.5	1.8	V	I_F = 4A
	See Fig. 1	-	1.8	2.2	V	I_F = 8A
		-	1.4	1.7	V	I_F = 4A, T_J = 125°C
I_R	Max. Reverse Leakage Current	-	0.17	3.0	µA	V_R = V_R Rated
		-	44	300	µA	T_J = 125°C, V_R = 0.8 x V_R Rated
C_T	Junction Capacitance	-	4	8	pF	V_R = 200V
L_S	Series Inductance	-	8.0	-	nH	Measured lead to lead 5mm from package body

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

	Parameters	Min	Typ	Max	Units	Test Conditions	
t_{rr}	Reverse Recovery Time	-	17	-	ns	I_F = 1.0A, di_F/dt = 200A/µA, V_R = 30V	
		-	28	42		T_J = 25°C	I_F = 4A V_R = 200V di_F/dt = 200A/µs
		-	38	57		T_J = 125°C	
I_{RRM}	Peak Recovery Current	-	2.9	5.2	A	T_J = 25°C	
		-	3.7	6.7		T_J = 125°C	
Q_{rr}	Reverse Recovery Charge	-	40	60	nC	T_J = 25°C	
		-	70	105		T_J = 125°C	
$di_{(rec)M}/dt$	Rate of Fall of recovery Current	-	280	-	A/µs	T_J = 25°C	
		-	235	-		T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameters	Min	Typ	Max	Units
T_J	Max. Junction Temperature Range	-	-	- 55 to 150	°C
T_{Stg}	Max. Storage Temperature Range	-	-	- 55 to 150	
T_S	Soldering Temperature, 10 sec	-	-	240	
R_{thJC}	Thermal Resistance, Junction to Case	-	-	5.0	°C/ W
R_{thJA} ①	Thermal Resistance, Junction to Ambient	-	-	80	
Wt	Weight	-	2.0	-	g
		-	0.07	-	(oz)
T	Mounting Torque	6.0	-	12	Kg*cm
		5.0	-	10	lbf*in

① Typical Socket Mount

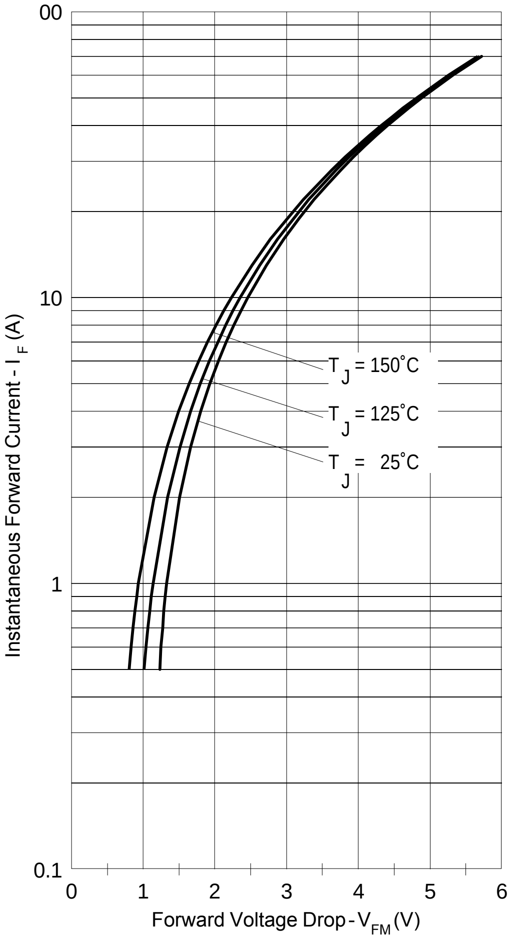


Fig. 1 - Typical Forward Voltage Drop Characteristics

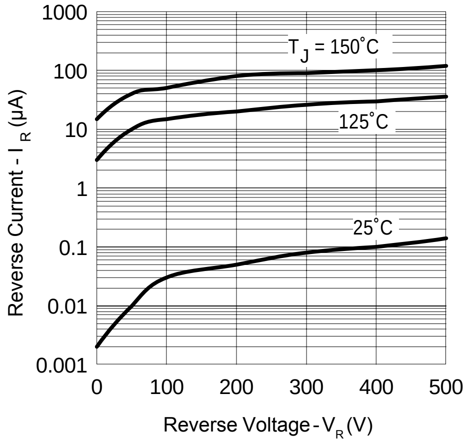


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

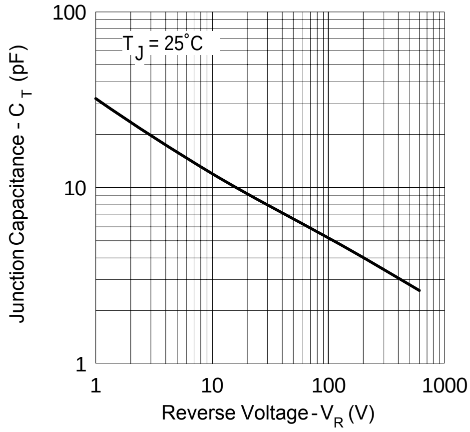


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

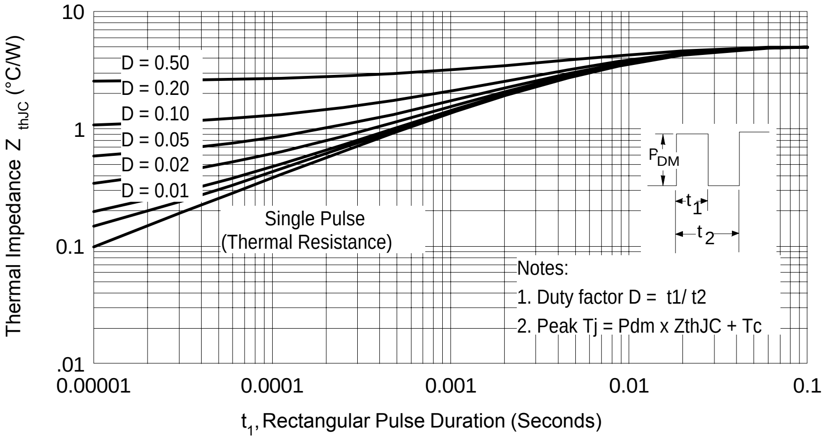


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

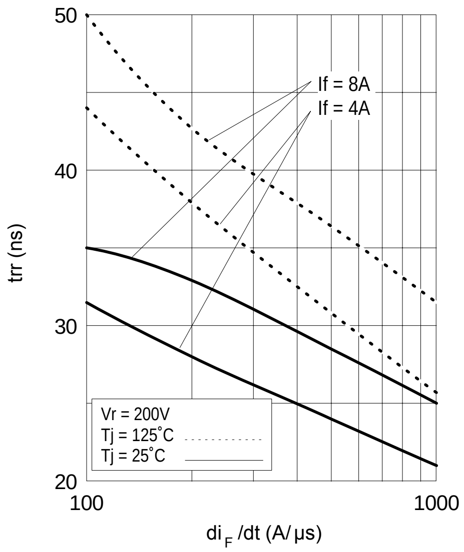


Fig. 5 - Typical Reverse Recovery vs. di_F/dt

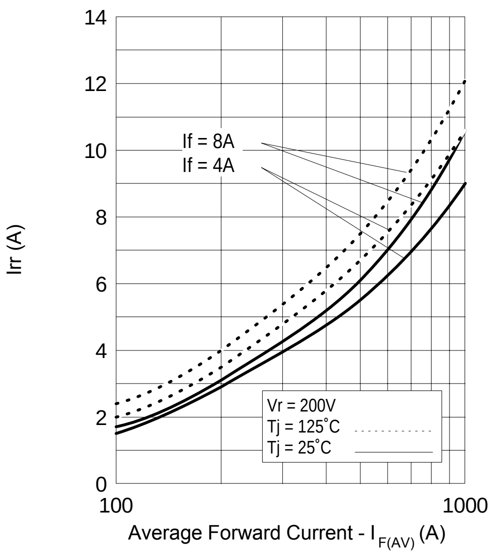


Fig. 6 - Typical Recovery Current vs. di_F/dt

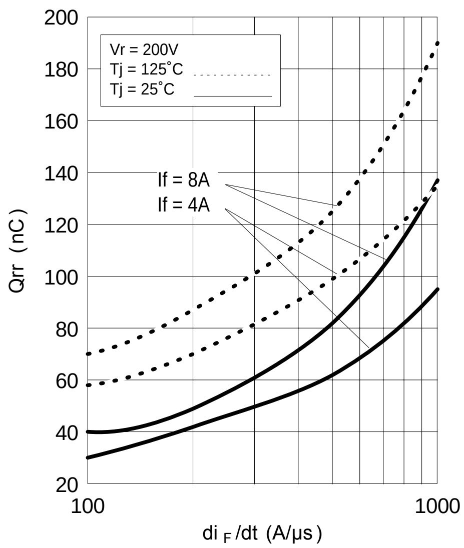


Fig. 7 - Typical Stored Charge vs. di_F/dt

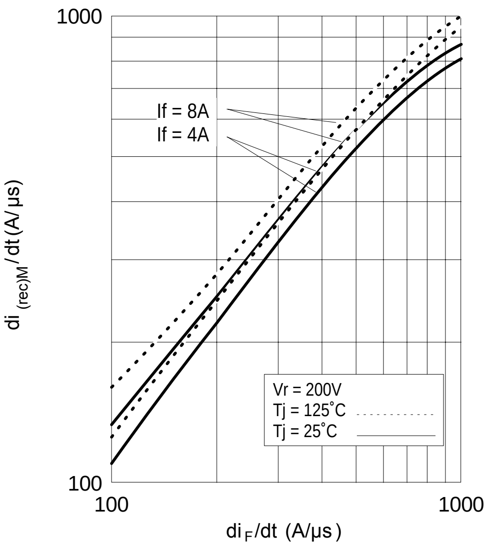


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_F/dt

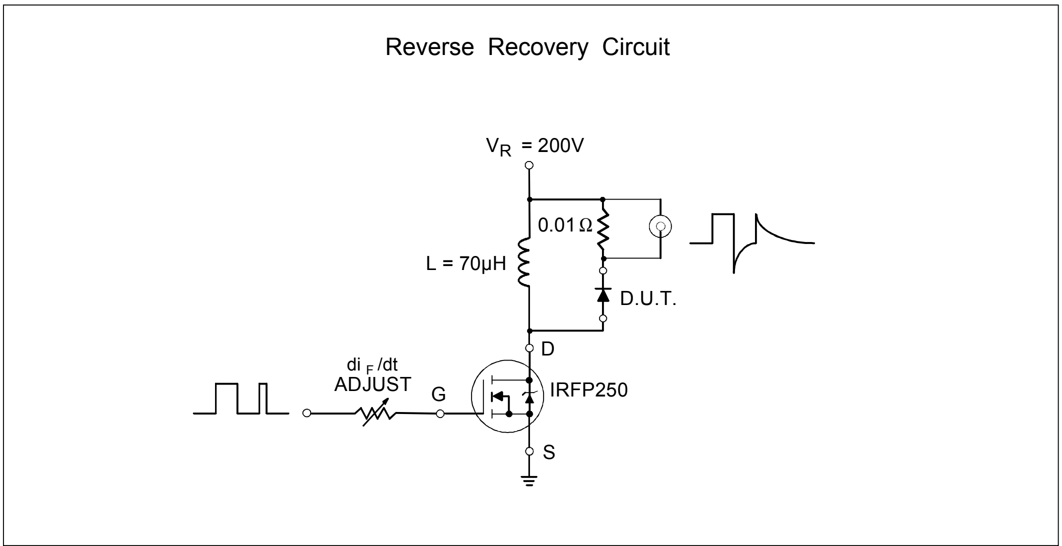
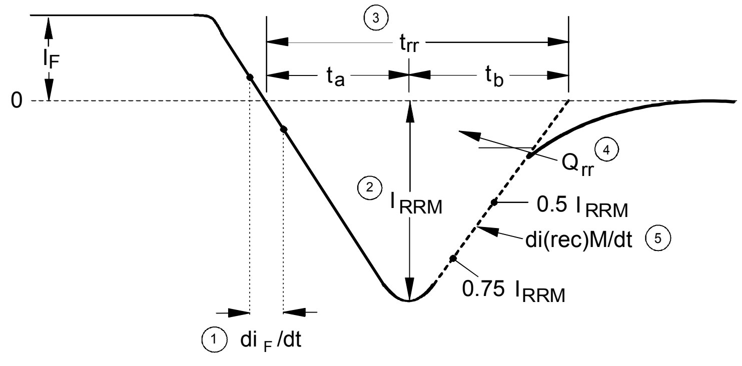


Fig. 9- Reverse Recovery Parameter Test Circuit



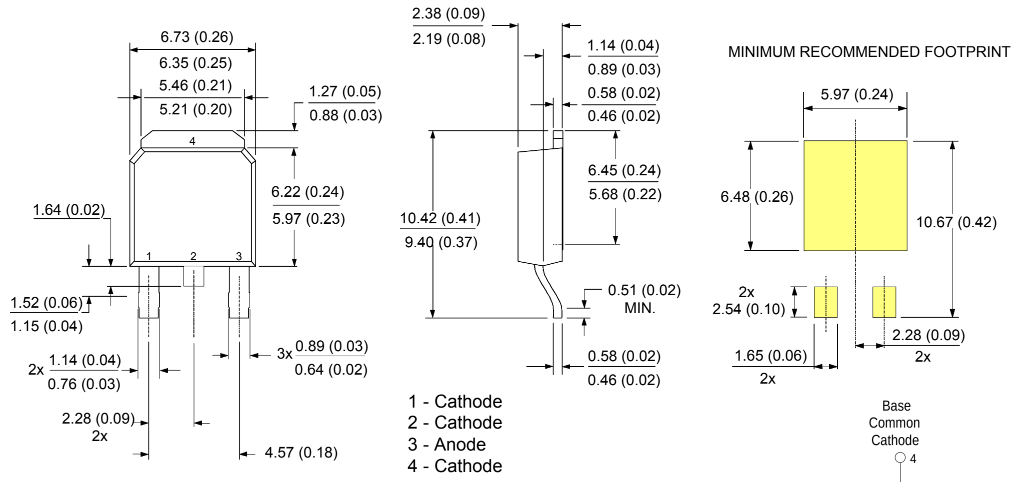
1. di_F/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr}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

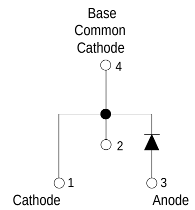
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

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

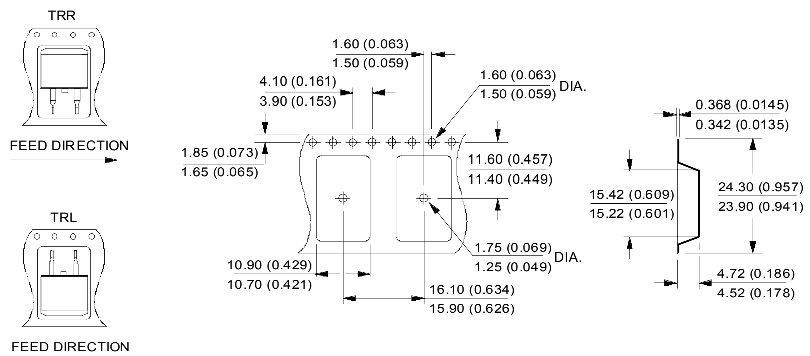
Outline Table

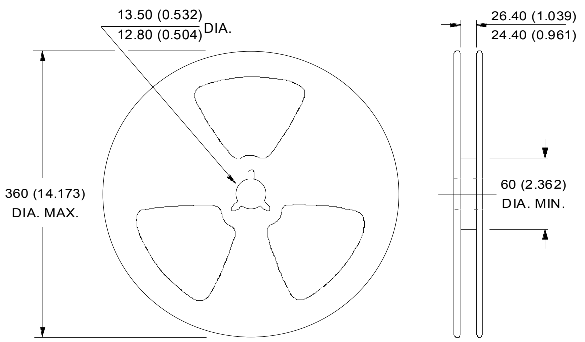




Conform to JEDEC outline D-Pak
Dimensions in millimeters and (inches)

Tape & Reel Information



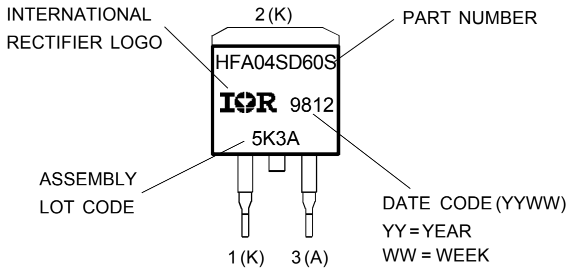


SMD-220 Tape & Reel

When ordering, indicate the part number, part orientation and the quantity. Quantities are in multiples of 800 pieces per reel for both TRL and TRR.

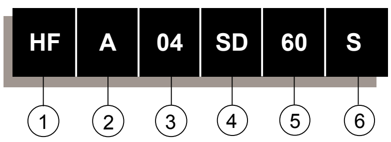
Marking Information

EXAMPLE: THIS IS AN HFA04SD60S



Ordering Information Table

Device Code



1 - Hexfred Family
2 - Electron Irradiated
3 - Current Rating (04 = 4A)
4 - D-PAK
5 - Voltage Rating (60 = 600V)
6 - Suffix

S	= D^2PAK/ Dpak
TR	= Tape & Reel
TRL	= Tape & Reel Left
TRR	= Tape & Reel Right

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level.
Qualification Standards can be found on IR's Web site.

International IOR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7309
Visit us at www.irf.com for sales contact information. 07/02