

FRED

HFA40HF60

Ultrafast, Soft Recovery Diode

Features

- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters
- Hermetic
- Surface Mount

$$V_R = 600V$$

$$V_F = 1.75V$$

$$Q_{rr} = 290nC$$

$$di_{(rec)M}/dt = 400A/\mu s$$

Description

These Ultrafast,soft recovery diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. An extensive characterization of the recovery behavior for different values of current, temperature and di/dt simplifies the calculations of losses in the operating conditions. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for power converters, motors drives and other applications where switching losses are significant portion of the total losses.

Absolute Maximum Ratings

	Parameter	Max.	Units
V_R	Cathode to Anode Voltage	600	V
$I_{F(AV)}$	Continuous Forward Current, ① $T_C = 100^\circ C$	22	A
I_{FSM}	Single Pulse Forward Current, ② $T_C = 25^\circ C$	225	
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	83	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ C$

Note: ① D.C. = 50% rect. wave

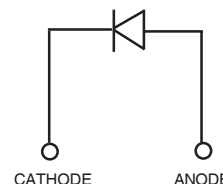
② 1/2 sine wave, 60 Hz , P.W. = 8.33 ms

CASE STYLE



SMD-1

(ISOLATED BASE)



Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	600	—	—	V	$I_R = 100\mu\text{A}$
V_F	Forward Voltage See Fig. 1	—	1.63	1.75	V	$I_F = 22\text{A}$
		—	2.07	2.25		$I_F = 45\text{A}$
		—	1.52	1.64		$I_F = 22\text{A}, T_J = 125^\circ\text{C}$
I_R	Max Reverse Leakage Current See Fig. 2	—	—	10	μA	$V_R = V_R \text{ Rated}$
		—	—	1.0	mA	$V_R = 480\text{V}, T_J = 125^\circ\text{C}$
C_T	Junction Capacitance, See Fig. 3	—	56	59	pF	$V_R = 200\text{V}$
L_S	Series Inductance	—	5.9	—	nH	Measured from center of cathode pad the center of anode pad

Dynamic Recovery Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
t_{rr1}	Reverse Recovery Time	—	60	97	ns	$T_J = 25^\circ\text{C}$ See Fig. 5
t_{rr2}		—	110	165		$T_J = 125^\circ\text{C}$
I_{RRM1}	Peak Recovery Current	—	5.2	7.8	A	$T_J = 25^\circ\text{C}$ See Fig. 6
I_{RRM2}		—	8.5	13		$T_J = 125^\circ\text{C}$
Q_{rr1}	Reverse Recovery Charge	—	190	290	nC	$T_J = 25^\circ\text{C}$ See Fig. 7
Q_{rr2}		—	560	840		$T_J = 125^\circ\text{C}$
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current During t_b	—	270	400	A/ μs	$T_J = 25^\circ\text{C}$ See Fig. 8
$di_{(rec)M}/dt2$		—	170	250		$T_J = 125^\circ\text{C}$

Thermal - Mechanical Characteristics

	Parameter	Typ.	Max.	Units
R_{thJC}	Junction-to-Case	—	1.5	$^\circ\text{C/W}$
Wt	Weight	2.6	—	g

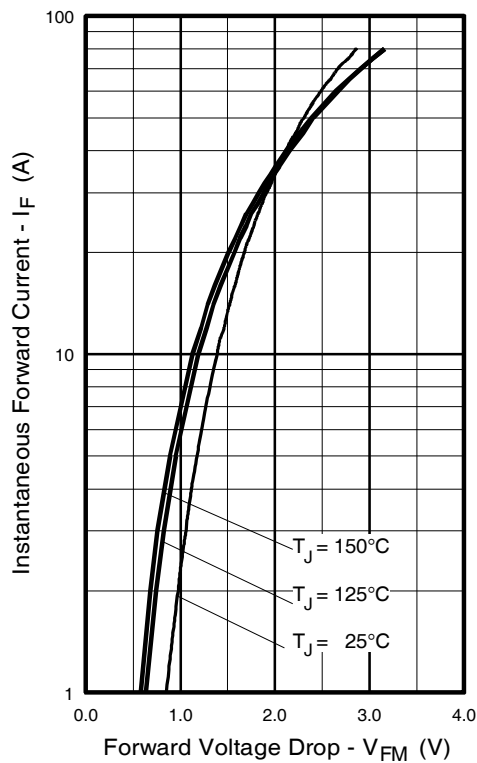


Fig. 1 - Maximum Forward Voltage Drop Vs. Instantaneous Forward Current

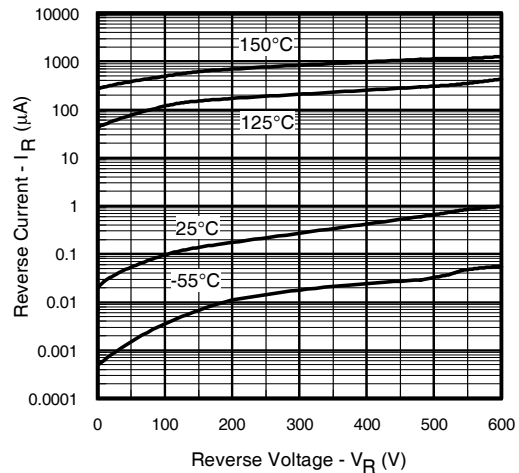


Fig. 2 - Typical Reverse Current Vs. Reverse Voltage

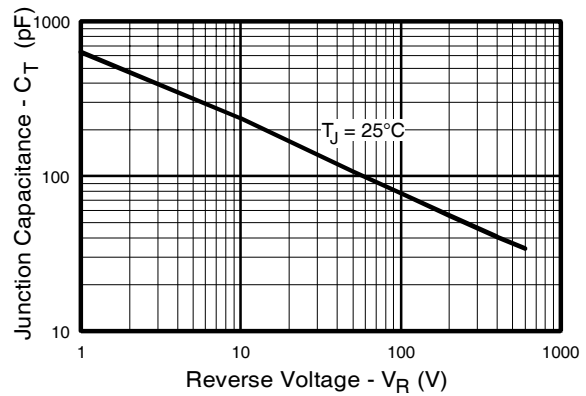


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

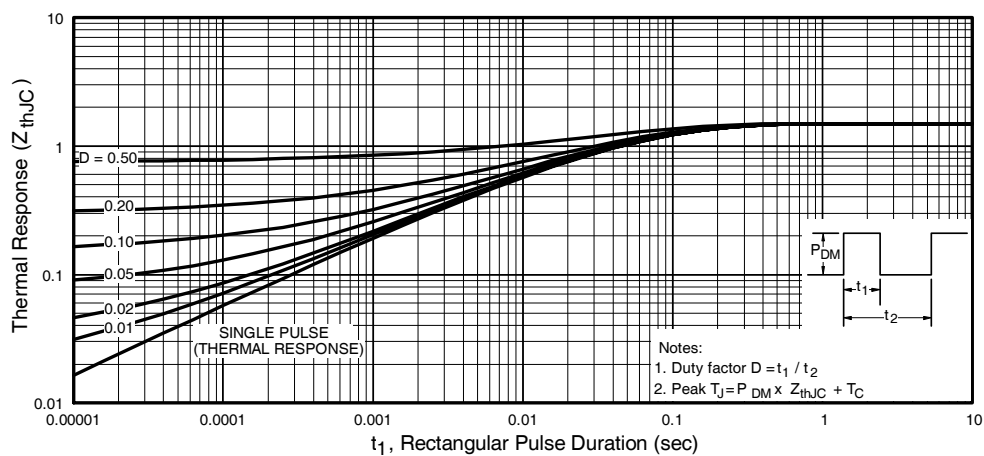
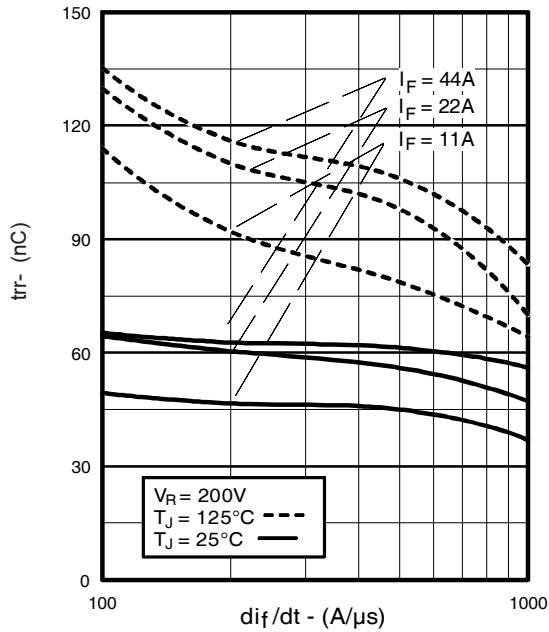
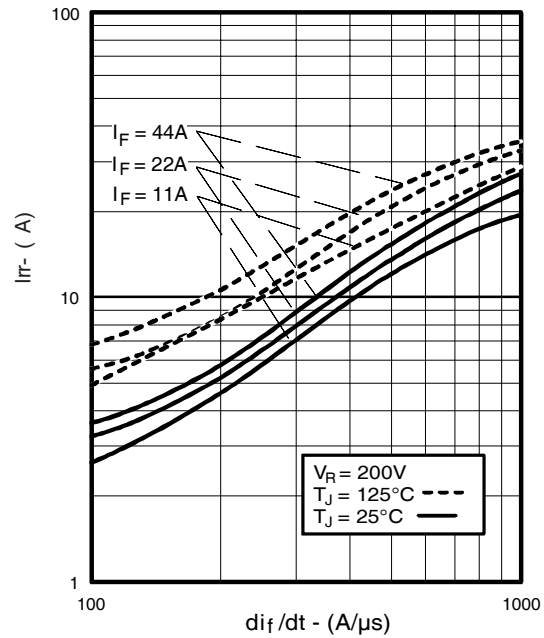
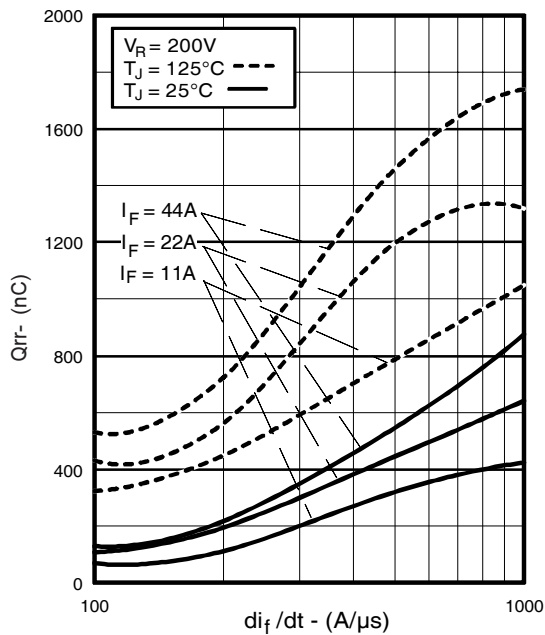
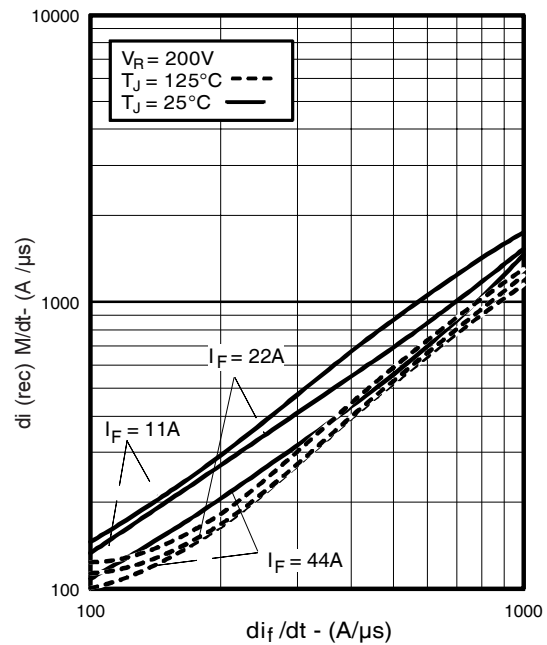


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics

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

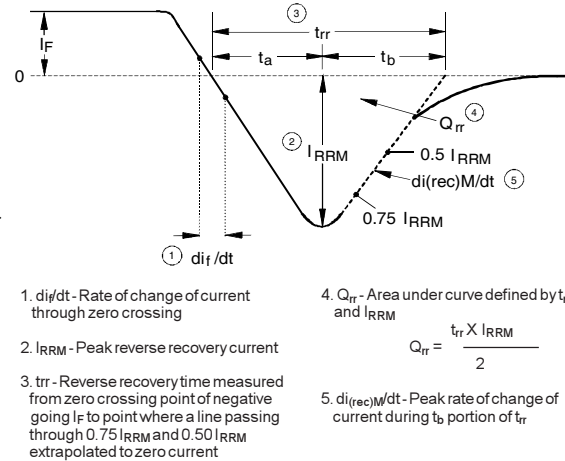
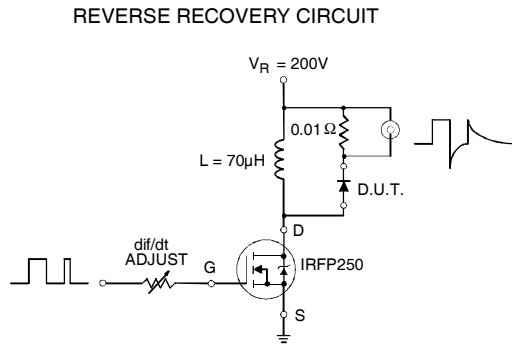
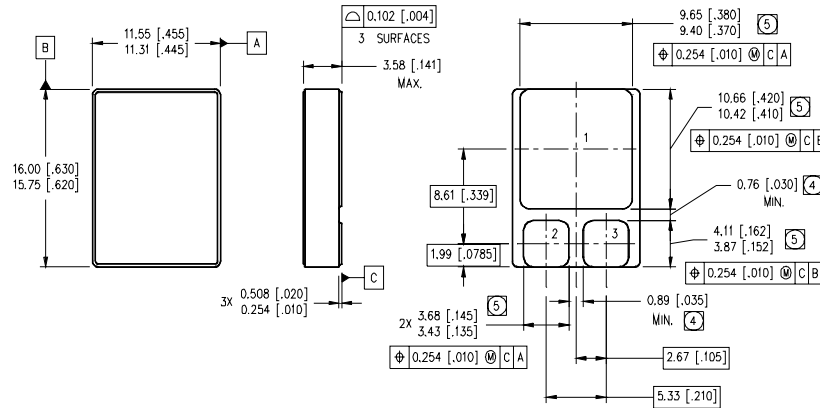


Fig. 9 - Reverse Recovery Parameter Test Circuit

Fig. 10 - Reverse Recovery Waveform and Definitions

Case Outline and Dimensions — SMD-1



NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. DIMENSION INCLUDES METALLIZATION FLASH.
5. DIMENSION DOES NOT INCLUDE METALLIZATION FLASH.

PAD ASSIGNMENTS

- 1 = CATHODE
- 2 = ANODE
- 3 = N / C