HFA40HF60

PD-20381D

Ultrafast, Soft Recovery Diode
Thru-Hole (TO-254AA)
600V, 22A

Features

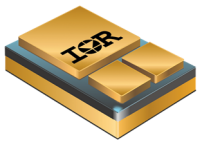
- Single diode configuration
- Reduced RFI and EMI
- Reduced snubbing
- Extensive characterization of recovery parameters
- Hermetic package
- Surface mount

Product Summary

- **V_R :** 600V
- **V_F :** 1.75V
- **Q_{rr} :** 190nC
- **$di_{(rec)M}/dt$:** 270A/µs

Potential Applications

- DC-DC converter
- Motor drives



SMD-1

Product Validation

Qualified according to MIL-PRF-19500 for space applications

Description

These 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, motor drives and other applications where switching losses are significant portion of the total losses.

Ordering Information

Table 1 Ordering options

Part number	Package	Screening Level
HFA40HF60	SMD-1	COTS
HFA40HF60SCV	SMD-1	JANTXV-equivalent
HFA40HF60SCX	SMD-1	JANTX-equivalent
HFA40HF60SCS	SMD-1	S-level

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1 Absolute Maximum Ratings

Table 2 Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_R	DC Reverse Voltage	600	V
I_F	Continuous Forward Current, T_C =100 °C [1]	22	A
I_{FSM}	Single pulse Forward Current, T_C = 25°C [2]	225	A
P_D @ T_C = 25°C	Maximum Power Dissipation	83	W
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	°C
Wt	Weight	2.6 (Typical)	g

[1] DC = 50% rect. wave

[2] ½ sine wave, 60 Hz, Pulse width = 8.33 ms

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2 Device Characteristics

2.1 Electrical Characteristics

Table 3 Electrical Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	600	—	—	V	I_R = 100µA
V_F	Forward Voltage Drop See Fig. 1	—	—	1.55	V	I_F = 22A, T_J = -55°C
		—	1.63	1.75		I_F = 22A, T_J = 25°C
		—	2.07	2.25		I_F = 45A, T_J = 25°C
		—	1.52	1.64		I_F = 22A, T_J = 125°C
I_R	Reverse Leakage Current See Fig. 2	—	—	10	µA	V_R = V_R Rated
		—	—	1.0	mA	V_R = 480V, T_J = 125°C
C_T	Junction Capacitance See Fig. 3	—	56	59	pF	V_R = 200V
L_S	Series Inductance	—	5.9	—	nH	Measured from center of cathode pad the center of anode pad

2.2 Dynamic Recovery Characteristics

Table 4 Dynamic Recovery Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	
t_{rr1}	Reverse Recovery Time See Fig. 5	—	60	97	ns	T_J = 25°C	I_F = 22A
t_{rr2}		—	110	—		T_J = 125°C	
I_{RRM1}	Peak Recovery Current See Fig. 6	—	5.2	—	A	T_J = 25°C	V_R = 200V
I_{RRM2}		—	8.5	—		T_J = 125°C	
Q_{rr1}	Reverse Recovery Charge See Fig. 7	—	190	—	nC	T_J = 25°C	di_f/dt = 200 A/ µs
Q_{rr2}		—	560	—		T_J = 125°C	
$di_{(rec)M}/dt_1$	Peak Rate of Fall of Recovery Current During t_b See Fig. 8	—	270	—	A/ µs	T_J = 25°C	
$di_{(rec)M}/dt_2$		—	170	—		T_J = 125°C	

2.3 Thermal-Mechanical Characteristics

Table 5 Thermal-Mechanical Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Junction to Case, Single Leg Conducting	—	1.5	°C/W

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3 Electrical Characteristics Curves

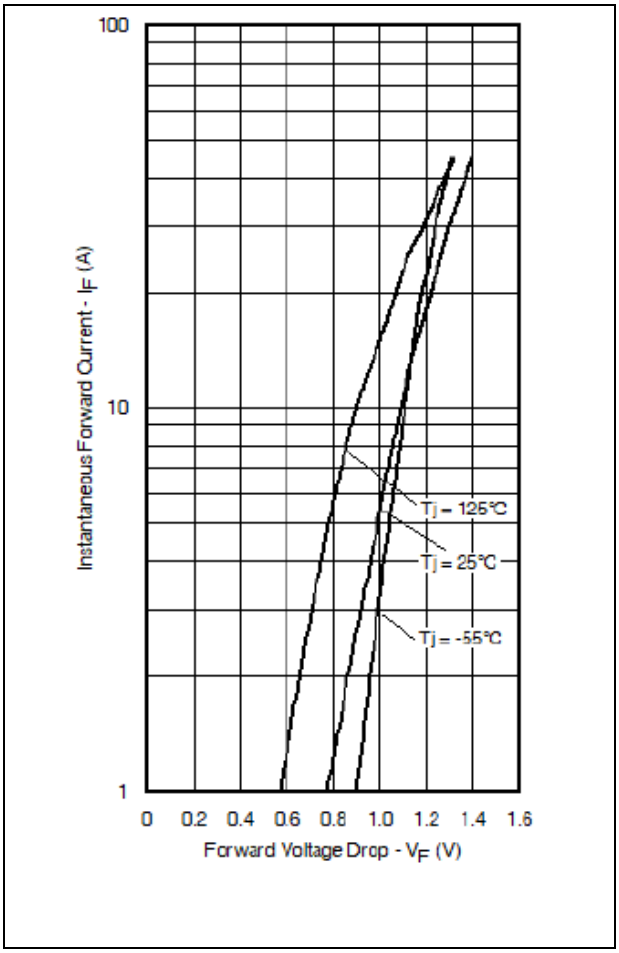

Figure 1 Maximum Forward Voltage Drop Characteristics

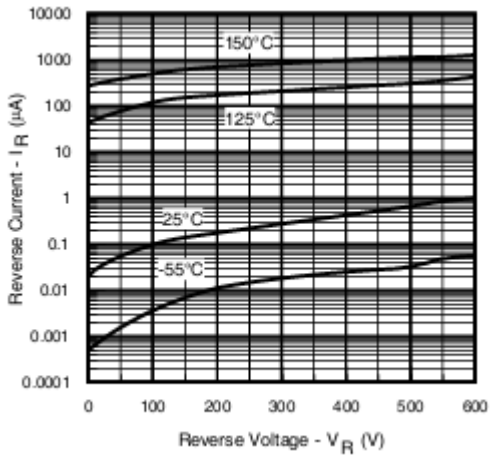

Figure 2 Typical Values of Reverse Current Vs. Reverse Voltage

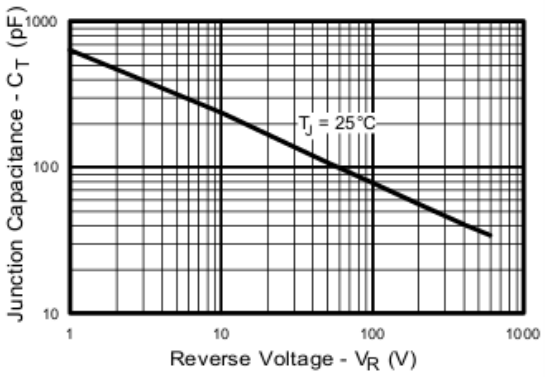

Figure 3 Typical Junction Capacitance Vs. Reverse Voltage

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Electrical Characteristics Curves

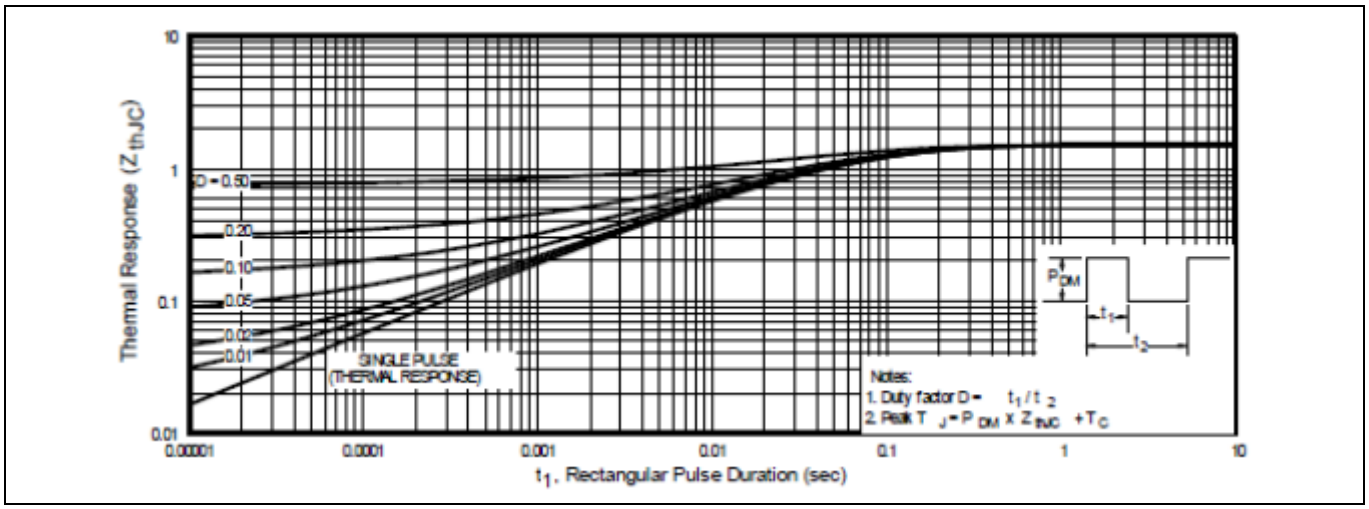

Figure 4 Maximum Thermal Impedance Z_{thJC} Characteristics

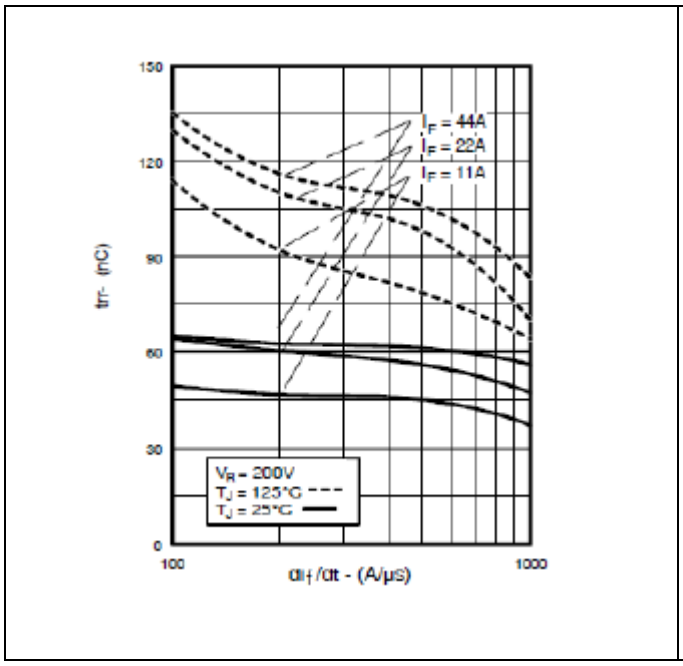

Figure 5 Typical Reverse Recovery Vs. di_f/dt

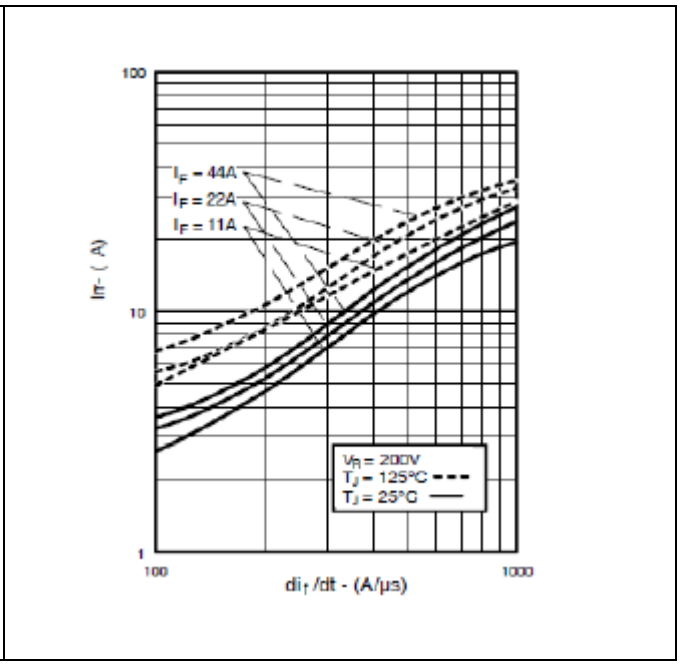

Figure 6 Typical Recovery Current Vs. di_f/dt

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Electrical Characteristics Curves

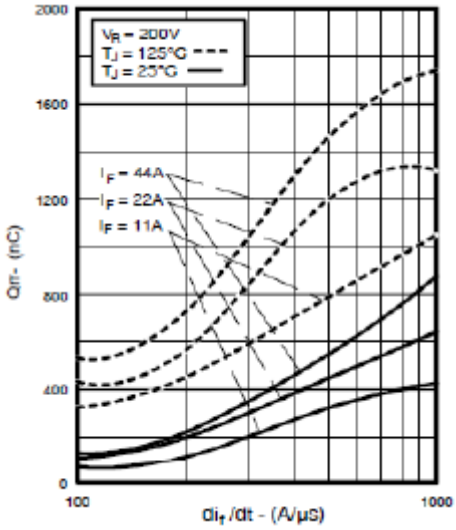

Figure 7 Typical Stored Charge Vs. di_f/dt

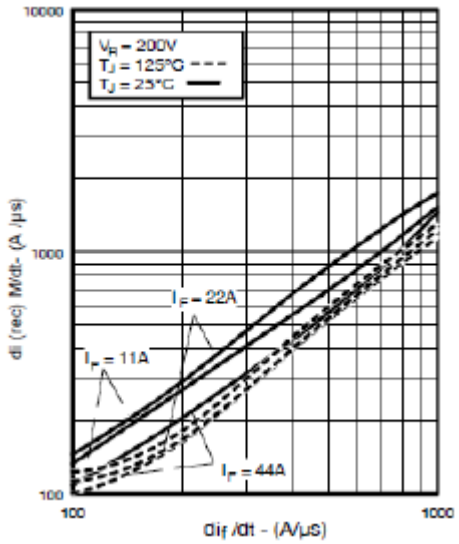

Figure 8 Typical $di_{(rec)M}/dt$ Vs. di_f/dt

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4 Test Circuit

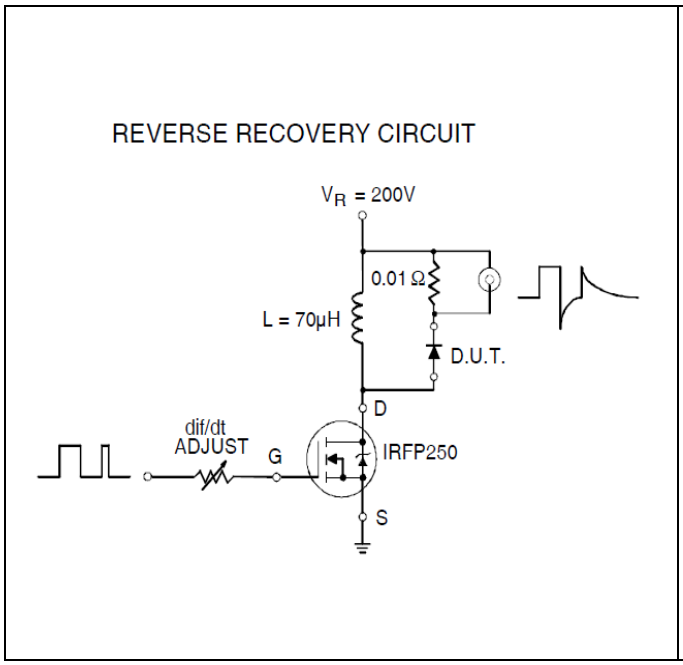

Figure 9 Reverse Recovery Parameter Test Circuit

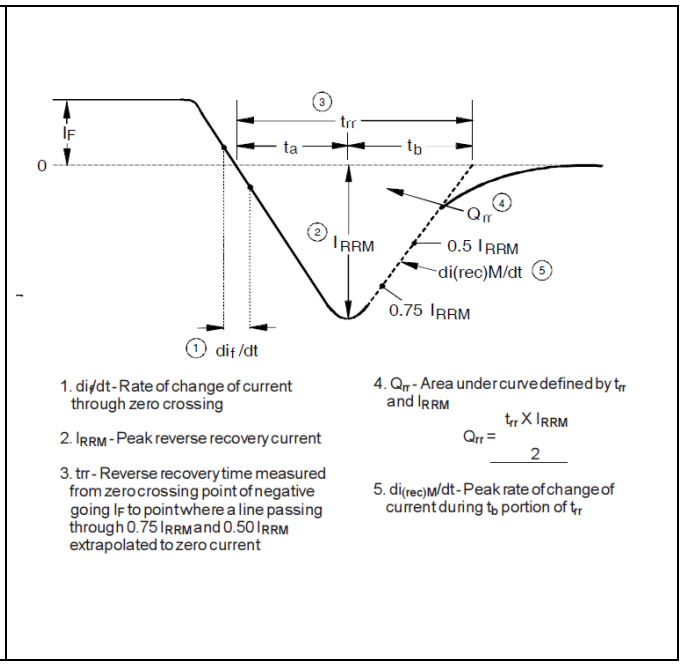

Figure 10 Reverse Recovery Waveform and Definitions

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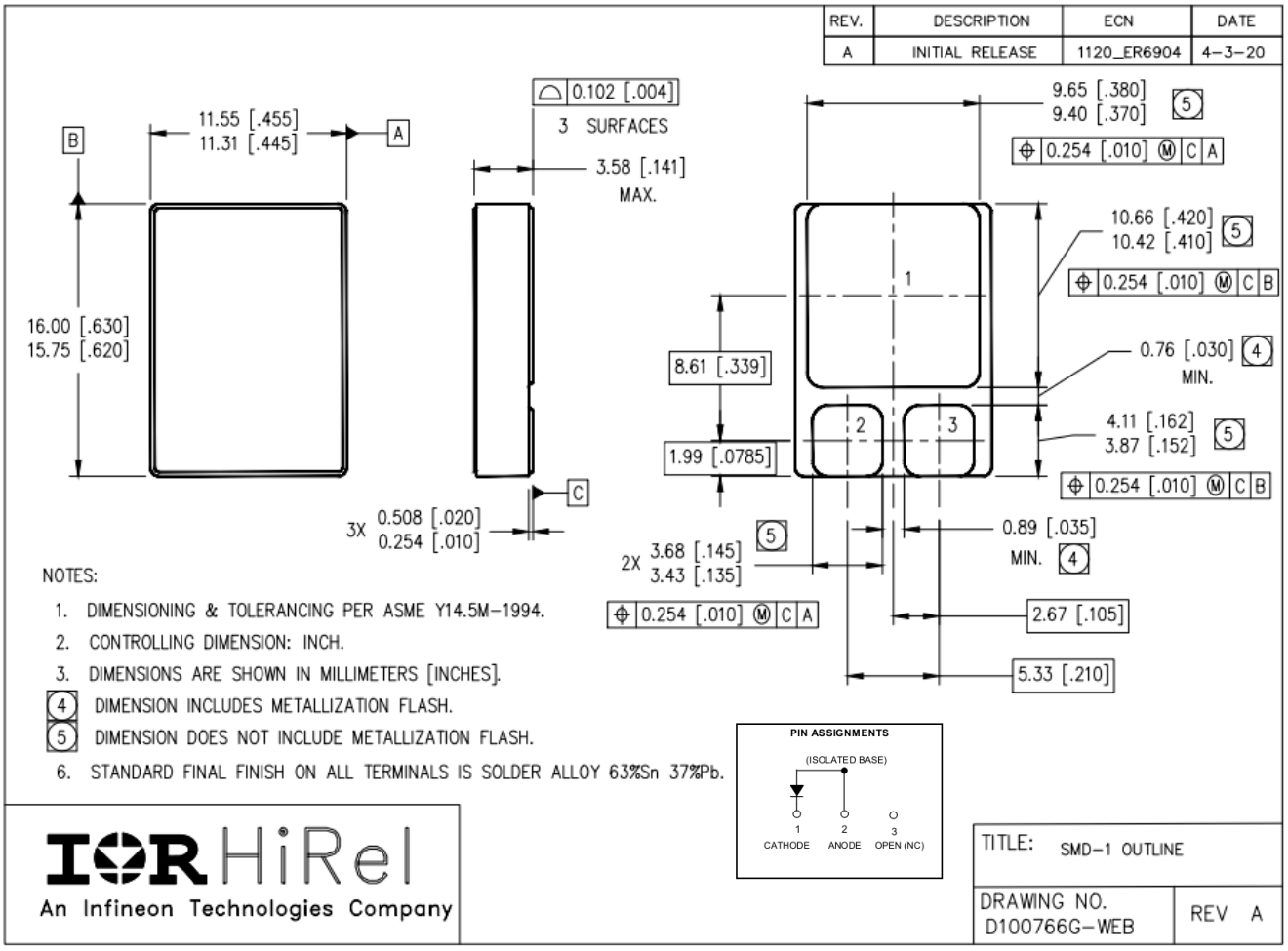
5 Package Outline

Note: For the most updated package outline, please see the website: SMD-1



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Revision history

Document version	Date of release	Description of changes
	6/30/1999	Final datasheet (PD-20381)
Rev A	04/10/2010	Updated per ECN-17456
Rev B	03/04/2013	Updated per ECN-1120-0911
Rev C	10/14/2016	Updated per ECN-1120-04754
Rev D	06/02/2022	Updated per ECN-1120-08972

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