FAIRCHILD SEMICONDUCTOR®

May 2003

FF1N30HS60DD

30A, 600V Stealth™ Diode

General Description

The FF1N30HS60DD is a Stealth™ diode optimized for low loss performance in high frequency hard switched applications. The Stealth™ family exhibits low reverse recovery current ($I_{RM(REC)}$) and exceptionally soft recovery under typical operating conditions.

This device is intended for use as a free wheeling or boost diode in power supplies and other power switching applications. The low $I_{RM(REC)}$ and short t_a phase reduce loss in switching transistors. The soft recovery minimizes ringing, expanding the range of conditions under which the diode may be operated without the use of additional snubber circuitry. Consider using the Stealth™ diode with an SMPS IGBT to provide the most efficient and highest power density design at lower cost.

Formerly developmental type TA49411.

Features

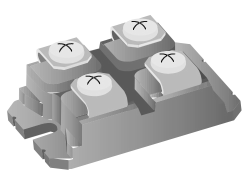
- Soft Recovery . . . . t_b / t_a > 1.2
- Fast Recovery . . . . t_{rr} < 35ns
- Operating Temperature . . . . 175^{o}C
- Reverse Voltage. 600V
- Fully Isolated Package (2,500 volt AC)
- Extremely Low Switching Losses
- Avalanche Energy Rated

Applications

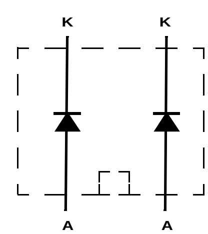
- Switch Mode Power Supplies
- Hard Switched CCM PFC Boost Diode
- UPS and Motor Drive Free Wheeling Diode
- SMPS FWD
- Snubber Diode

Package

JEDEC SOT-227



Symbol



Device Maximum Ratings (per diode) T_C = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{RRM}	Repetitive Peak Reverse Voltage	600	V
V_{RWM}	Working Peak Reverse Voltage	600	V
V_R	DC Blocking Voltage	600	V
$I_{F(AV)}$	Average Rectified Forward Current (T_C = 110^{o}C)	30	A
I_{FRM}	Repetitive Peak Surge Current (20kHz Square Wave)	70	A
I_{FSM}	Nonrepetitive Peak Surge Current (Halfwave 1 Phase 60Hz)	325	A
P_D	Power Dissipation	136	W
E_{AVL}	Avalanche Energy (1A, 40mH)	20	mJ
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 175	°C
M_d	Mounting force Terminal connection torque	1.5/13 1.5/13	Nm/lb.in. Nm/lb.in.
T_L T_{PKG}	Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10s Package Body for 10s, See Techbrief TB334	 300 260	 °C °C

CAUTION: Stresses above those listed in “Device Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Package Marking and Ordering Information

Device Marking	Device	Package	Tape Width	Quantity
FF1N30HS60DD	FF1N30HS60DD	SOT-227	-	10

Electrical Characteristics (per diode) T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
Off State Characteristics							
I_R	Instantaneous Reverse Current	V_R = 600V	T_C = 25°C	-	-	100	µA
			T_C = 125°C	-	-	1.0	mA
On State Characteristics							
V_F	Instantaneous Forward Voltage	I_F = 30A	T_C = 25°C	-	2.1	2.4	V
			T_C = 125°C	-	1.7	2.1	V
Dynamic Characteristics							
C_J	Junction Capacitance	V_R = 10V, I_F = 0A		-	120	-	pF
Switching Characteristics							
t_{rr}	Reverse Recovery Time	I_F = 1A, dI_F/dt = 100A/µs, V_R = 30V		-	27	35	ns
		I_F = 30A, dI_F/dt = 100A/µs, V_R = 30V		-	36	45	ns
t_{rr}	Reverse Recovery Time	I_F = 30A, dI_F/dt = 200A/µs, V_R = 390V, T_C = 25°C		-	36	-	ns
$I_{RM(REC)}$	Maximum Reverse Recovery Current			-	2.9	-	A
Q_{RR}	Reverse Recovered Charge			-	55	-	nC
t_{rr}	Reverse Recovery Time	I_F = 30A, dI_F/dt = 200A/µs, V_R = 390V, T_C = 125°C		-	110	-	ns
S	Softness Factor (t_b/t_a)			-	1.9	-	
$I_{RM(REC)}$	Maximum Reverse Recovery Current			-	6	-	A
Q_{RR}	Reverse Recovered Charge			-	450	-	nC
t_{rr}	Reverse Recovery Time	I_F = 30A, dI_F/dt = 1000A/µs, V_R = 390V, T_C = 125°C		-	60	-	ns
S	Softness Factor (t_b/t_a)			-	1.25	-	
$I_{RM(REC)}$	Maximum Reverse Recovery Current			-	21	-	A
Q_{RR}	Reverse Recovered Charge				730	-	nC
dI_M/dt	Maximum di/dt during t_b			-	800	-	A/µs
Thermal Characteristics							
$R_{\theta JC}$	Thermal Resistance Junction to Case			-	-	1.1	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	SOT-227		-	-	12	°C/W

Typical Performance Curves

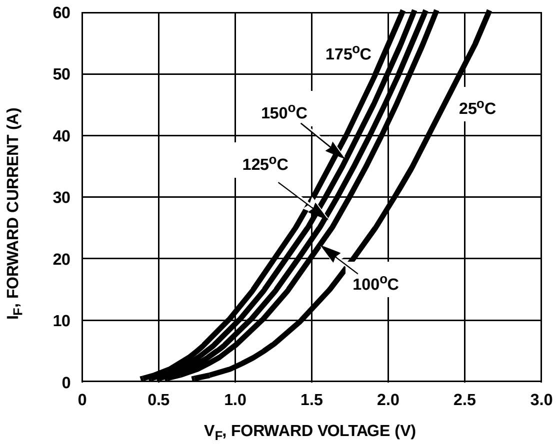


Figure 1. Forward Current vs Forward Voltage

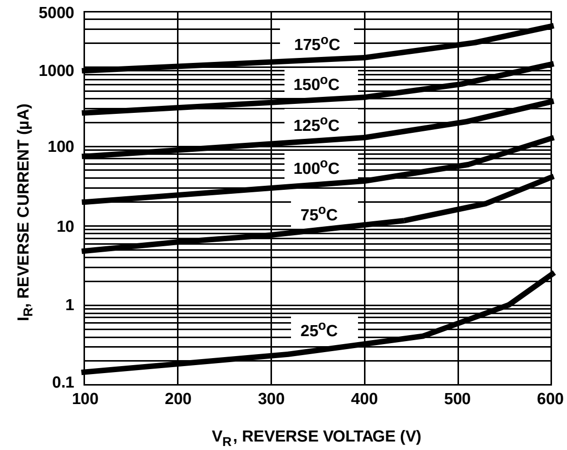


Figure 2. Reverse Current vs Reverse Voltage

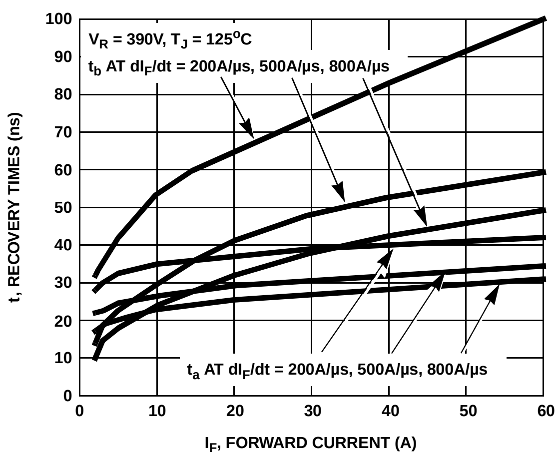


Figure 3. t_a and t_b Curves vs Forward Current

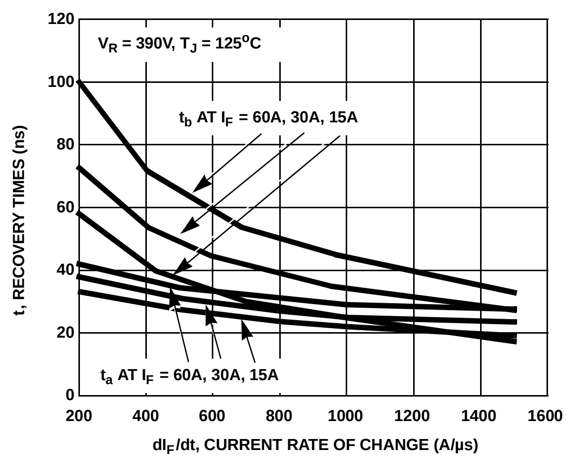


Figure 4. t_a and t_b Curves vs dI_F/dt

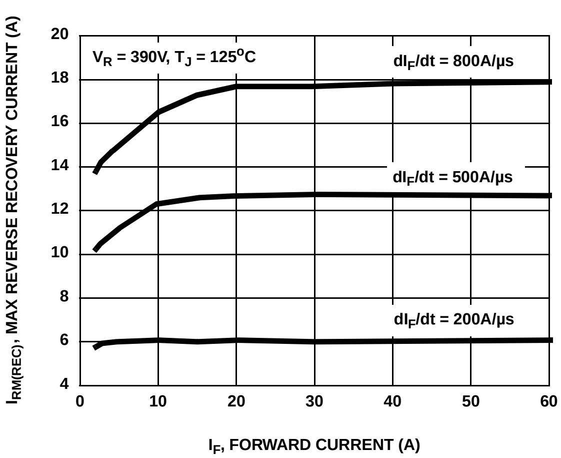


Figure 5. Maximum Reverse Recovery Current vs Forward Current

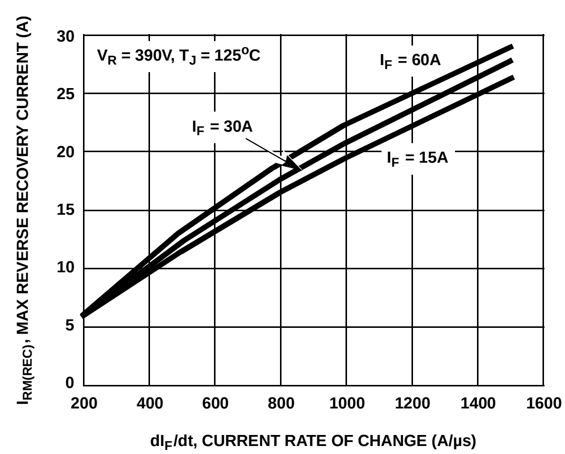


Figure 6. Maximum Reverse Recovery Current vs dI_F/dt

Typical Performance Curves (Continued)

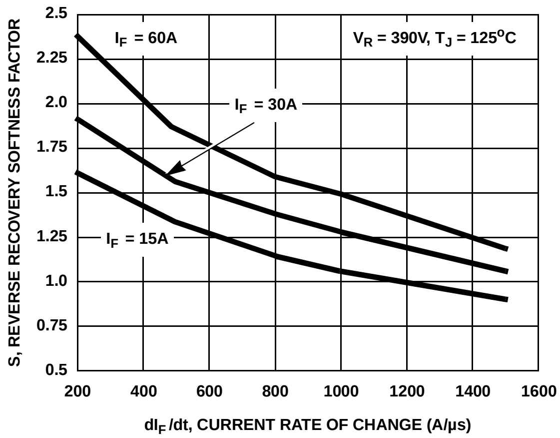


Figure 7. Reverse Recovery Softness Factor vs dI_F/dt

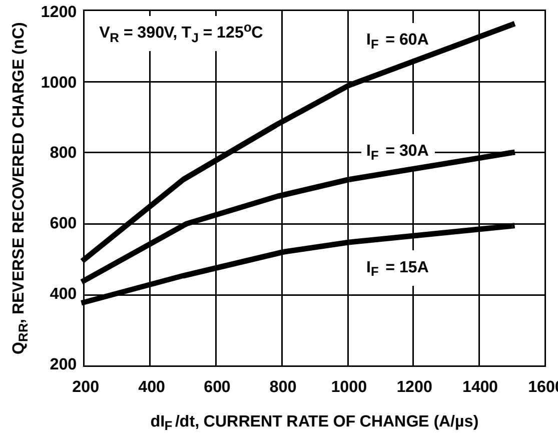


Figure 8. Reverse Recovered Charge vs dI_F/dt

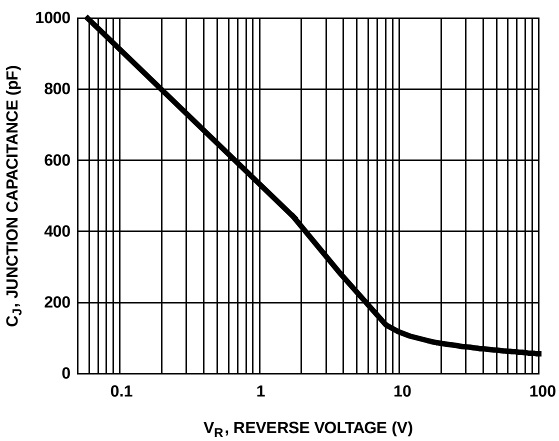


Figure 9. Junction Capacitance vs Reverse Voltage

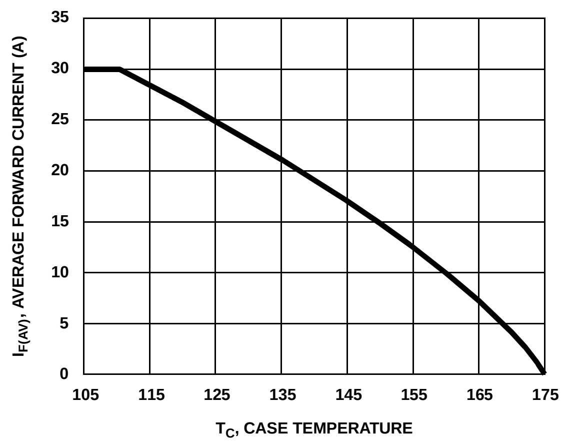


Figure 10. DC Current Derating Curve

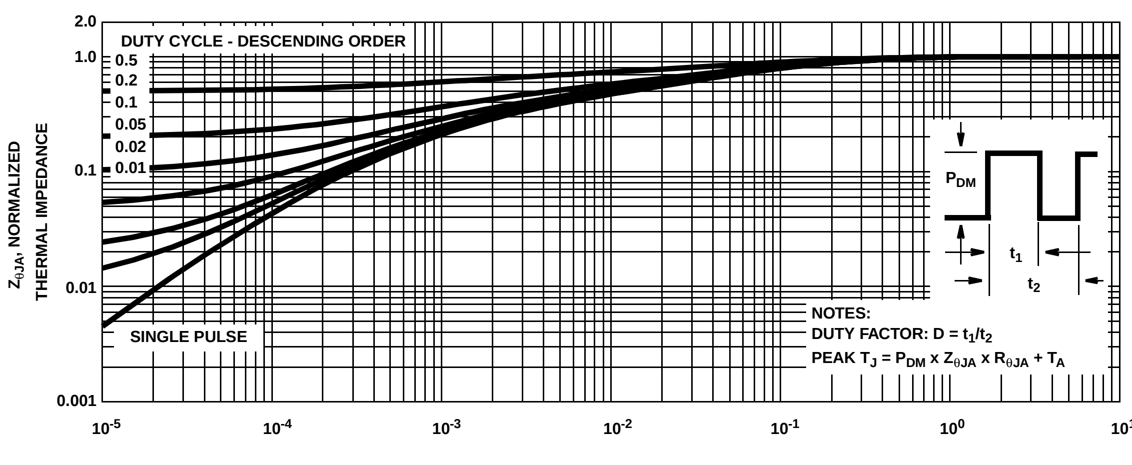


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit and Waveforms

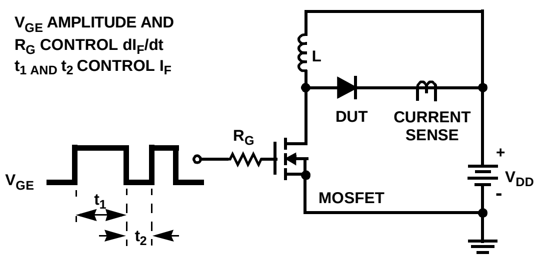


Figure 12. t_{rr} Test Circuit

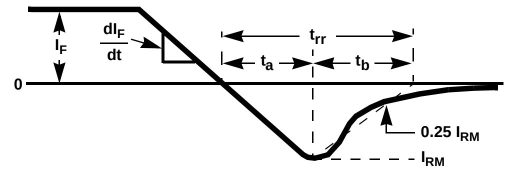


Figure 13. t_{rr} Waveforms and Definitions

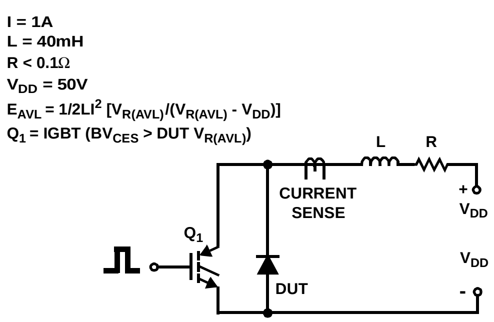


Figure 14. Avalanche Energy Test Circuit

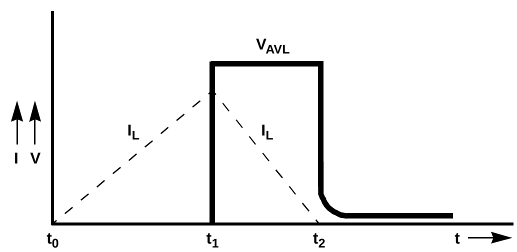


Figure 15. Avalanche Current and Voltage Waveforms

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Programmable Active Droop™		OPTOPLANAR™	SMART START™	

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No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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Rev. I2

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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

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