

6A, 600V Hyperfast Diodes

The RHRD660S9A_F085 is hyperfast diodes with soft recovery characteristics ($t_{rr} < 30ns$). It has half the recovery time of ultrafast diodes and are silicon nitride passivated ion-implanted epitaxial planar construction.

This device is intended for use as freewheeling/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Its low stored charge and hyperfast soft recovery minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

Formerly developmental type TA49057.

Ordering Information

PART NUMBER	PACKAGE	BRAND
RHRD660S9A_F085	TO-252	RHR660

Features

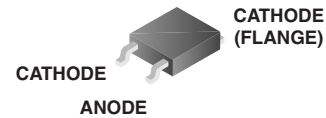
- Hyperfast with Soft Recovery <30ns
- Operating Temperature 175°C
- Reverse Voltage Up To 600V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Packaging

JEDEC STYLE TO-252



Symbol



Absolute Maximum Ratings $T_C = 25^{\circ}C$, Unless Otherwise Specified

	RHRD660S9A_F085	UNITS
Peak Repetitive Reverse Voltage	V_{RRM} 600	V
Working Peak Reverse Voltage	V_{RWM} 600	V
DC Blocking Voltage	V_R 600	V
Average Rectified Forward Current ($T_C = 152^{\circ}C$)	$I_{F(AV)}$ 6	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FRM} 12	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz)	I_{FSM} 60	A
Maximum Power Dissipation	P_D 50	W
Avalanche Energy (See Figures 10 and 11)	E_{AVL} 10	mJ
Operating and Storage Temperature	T_{STG}, T_J -65 to 175	°C
Maximum Lead Temperature for Soldering (Leads at 0.063 in. (1.6mm) from case for 10s)	T_L 300	°C
Package Body for 10s, see Tech Brief 334.	T_{PKG} 260	°C

Electrical Specifications $T_C = 25^\circ\text{C}$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
V_F	$I_F = 6\text{A}$	-	-	2.1	V
	$I_F = 6\text{A}, T_C = 150^\circ\text{C}$	-	-	1.7	V
I_R	$V_R = 600\text{V}$	-	-	100	μA
	$V_R = 600\text{V}, T_C = 150^\circ\text{C}$	-	-	500	μA
t_{rr}	$I_F = 1\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	-	30	ns
	$I_F = 6\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	-	35	ns
t_a	$I_F = 6\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	16	-	ns
t_b	$I_F = 6\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	8.5	-	ns
Q_{RR}	$I_F = 6\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	45	-	nC
C_J	$V_R = 10\text{V}, I_F = 0\text{A}$	-	20	-	pF
$R_{\theta JC}$		-	-	3	$^\circ\text{C}/\text{W}$

DEFINITIONS

V_F = Instantaneous forward voltage ($p_w = 300\mu\text{s}$, $D = 2\%$).

I_R = Instantaneous reverse current.

t_{rr} = Reverse recovery time (See Figure 9), summation of $t_a + t_b$.

t_a = Time to reach peak reverse current (See Figure 9).

t_b = Time from peak I_{RM} to projected zero crossing of I_{RM} based on a straight line from peak I_{RM} through 25% of I_{RM} (See Figure 9).

Q_{RR} = Reverse recovery charge.

C_J = Junction capacitance.

$R_{\theta JC}$ = Thermal resistance junction to case.

p_w = Pulse width.

D = Duty cycle.

Typical Performance Curves

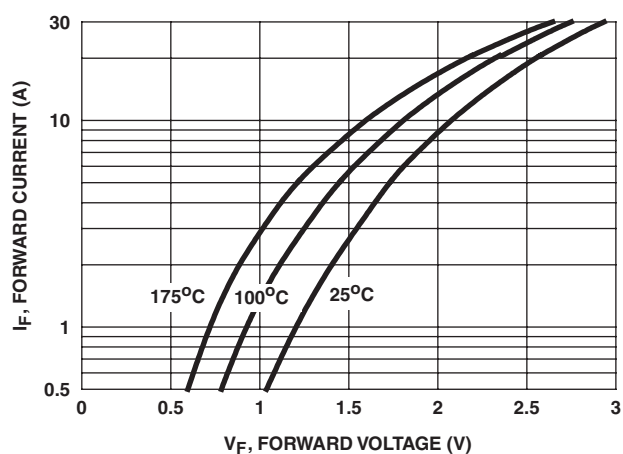


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

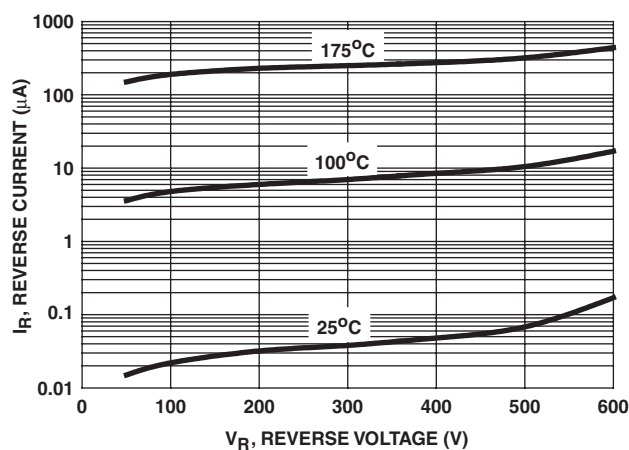


FIGURE 2. REVERSE CURRENT vs REVERSE

Typical Performance Curves (Continued)

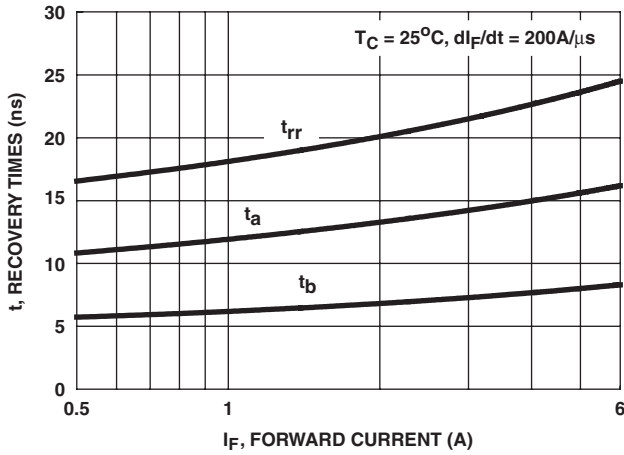


FIGURE 3. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

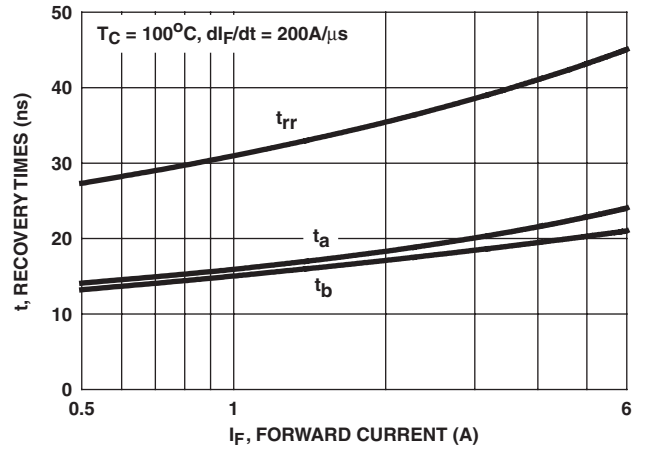


FIGURE 4. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

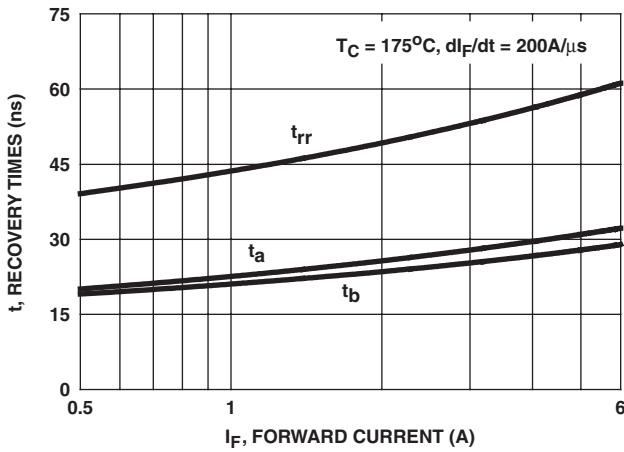


FIGURE 5. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

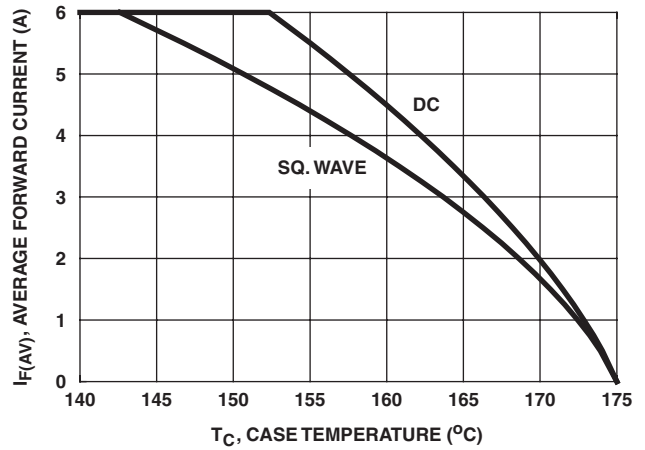


FIGURE 6. CURRENT DERATING CURVE

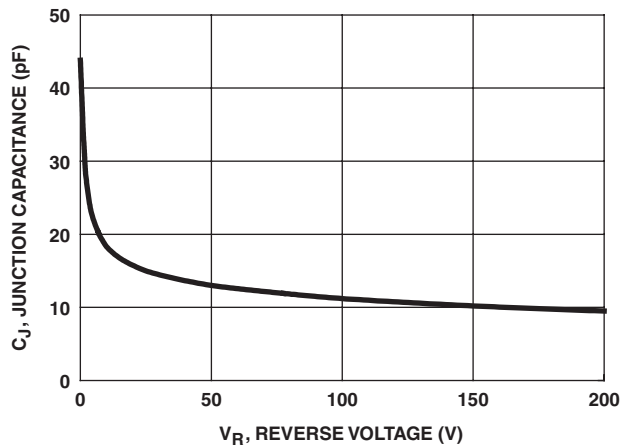


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

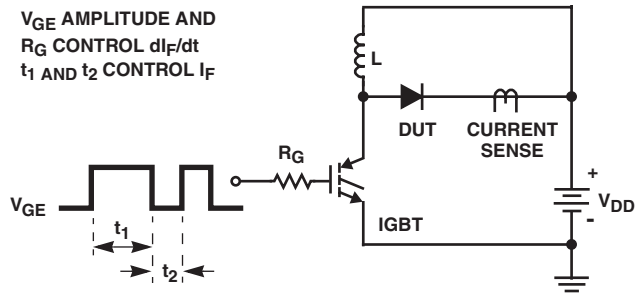


FIGURE 8. t_{rr} TEST CIRCUIT

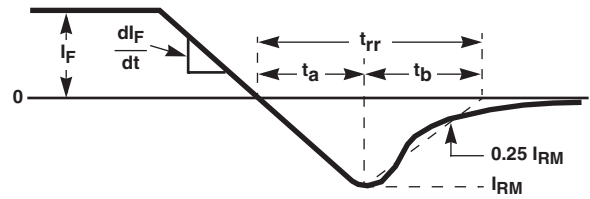


FIGURE 9. t_{rr} WAVEFORMS AND DEFINITIONS

$I_{MAX} = 1A$
 $L = 20mH$
 $R < 0.1\Omega$
 $E_{AVL} = 1/2Li^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$
 $Q_1 = IGBT (BV_{CES} > DUT V_{R(AVL)})$

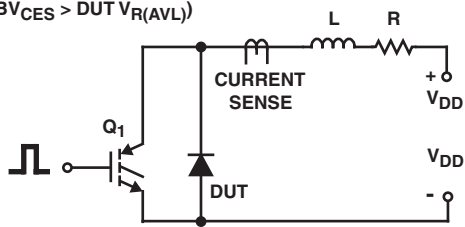


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

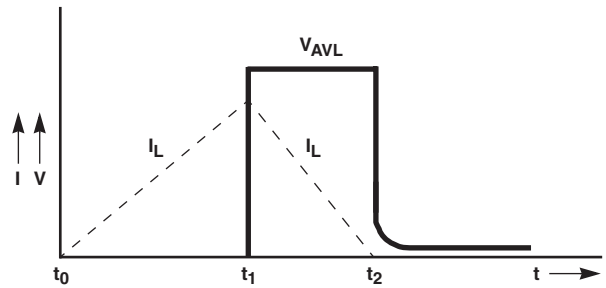







FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS



TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

- | | | | |
|---|---|---|---|
| AccuPower™ | FPST™ | Power-SPM™ | The Power Franchise® |
| Auto-SPM™ | F-PFST™ | PowerTrench® | The Right Technology for Your Success™ |
| AX-CAP™* | FRFET® | PowerXS™ | |
| BitSiC® | Global Power Resource SM | Programmable Active Droop™ | power |
| Build it Now™ | Green FPS™ | QFET® | franchise |
| CorePLUS™ | Green FPS™ e-Series™ | QS™ | TinyBoost™ |
| CorePOWER™ | Gmax™ | Quiet Series™ | TinyBuck™ |
| CROSSVOLT™ | GTO™ | RapidConfigure™ | TinyCalc™ |
| CTL™ | IntelliMAX™ |  | TinyLogic® |
| Current Transfer Logic™ | ISOPLANAR™ | Saving our world, 1mW/W/kW at a time™ | TINYOPTO™ |
| DEUXPEED® | MegaBuck™ | SignalWise™ | TinyPower™ |
| Dual Cool™ | MICROCOUPLER™ | SmartMax™ | TinyPWM™ |
| EcoSPARK® | MicroFET™ | SMART START™ | TinyWire™ |
| EfficientMax™ | MicroPak™ | SPM® | TranSiC® |
| ESBC™ | MicroPak2™ | STEALTH™ | TriFault Detect™ |
|  | MillerDrive™ | SuperFET® | TRUECURRENT®* |
| Fairchild® | MotionMax™ | SuperSOT™-3 | µSerDes™ |
| Fairchild Semiconductor® | mWSaver™ | SuperSOT™-6 |  |
| FACT Quiet Series™ | OptiHIT™ | SuperSOT™-8 | UHC® |
| FACT® | OPTOLOGIC® | SupreMOS® | Ultra FRFET™ |
| FAST® | OPTOPLANAR® | SyncFET™ | UniFET™ |
| FastvCore™ |  | Sync-Lock™ | VCX™ |
| FETBench™ | PDP SPM™ |  | VisualMax™ |
| FlashWriter®* | | | XS™ |

*Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used here in:

- Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
- A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.Fairchildsemi.com, under Sales Support. Counterfeiting of semiconductor parts is a growing problem in the industry. All manufactures of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed application, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address and warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS
Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.