

15A, 1200V Hyperfast Diode

The RHRP15120 is a hyperfast diode with soft recovery characteristics ($t_{rr} < 65\text{ns}$). It has half the recovery time of ultrafast diodes and is of silicon nitride passivated ion-implanted epitaxial planar construction.

This device is intended for use as a freewheeling/clamping diode and rectifier 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, thus reducing power loss in the switching transistors.

Formerly developmental type TA49098.

Ordering Information

PART NUMBER	PACKAGE	BRAND
RHRP15120	TO-220AC	RHR15120

NOTE: When ordering, use the entire part number.

Symbol



Features

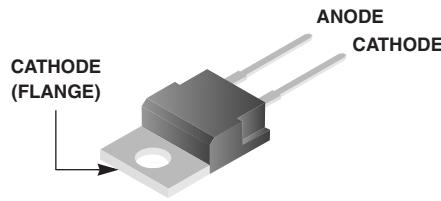
- Hyperfast with Soft Recovery <65ns
- Operating Temperature 175°C
- Reverse Voltage 1200V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Packaging

JEDEC TO-220AC



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

	RHRP15120	UNITS
Peak Repetitive Reverse Voltage	$.V_{RRM}$	V
Working Peak Reverse Voltage	$.V_{RWM}$	V
DC Blocking Voltage	$.V_R$	V
Average Rectified Forward Current ($T_C = 140^\circ\text{C}$)	$I_{F(AV)}$	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FRM}	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz)	I_{FSM}	A
Maximum Power Dissipation	P_D	W
Avalanche Energy (See Figures 10 and 11)	E_{AVL}	mJ
Operating and Storage Temperature	T_{STG}, T_J	$^\circ\text{C}$
	-65 to 175	

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
V_F	$I_F = 15\text{A}$	-	-	3.2	V
	$I_F = 15\text{A}, T_C = 150^\circ\text{C}$	-	-	2.6	V
I_R	$V_R = 1200\text{V}$	-	-	100	μA
	$V_R = 1200\text{V}, T_C = 150^\circ\text{C}$	-	-	500	μA
t_{rr}	$I_F = 1\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	65	ns
	$I_F = 15\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	75	ns
t_a	$I_F = 15\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	36	-	ns
t_b	$I_F = 15\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	28	-	ns
Q_{RR}	$I_F = 15\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	150	-	nC
C_J	$V_R = 10\text{V}, I_F = 0\text{A}$	-	55	-	pF
$R_{\theta JC}$		-	-	1.5	$^\circ\text{C}/\text{W}$

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300 μs , 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.

pw = pulse width.

D = duty cycle.

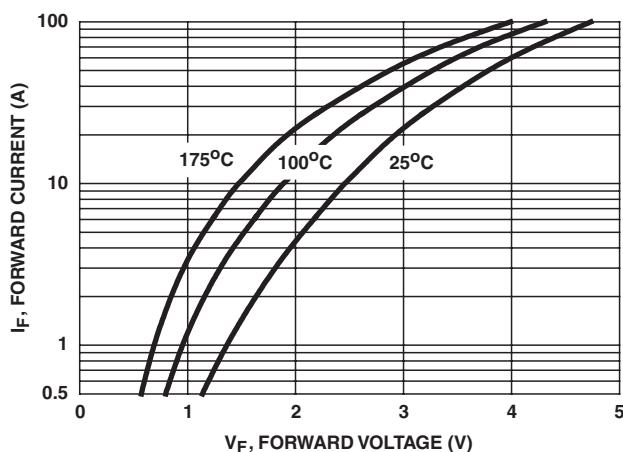
Typical Performance Curves

FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

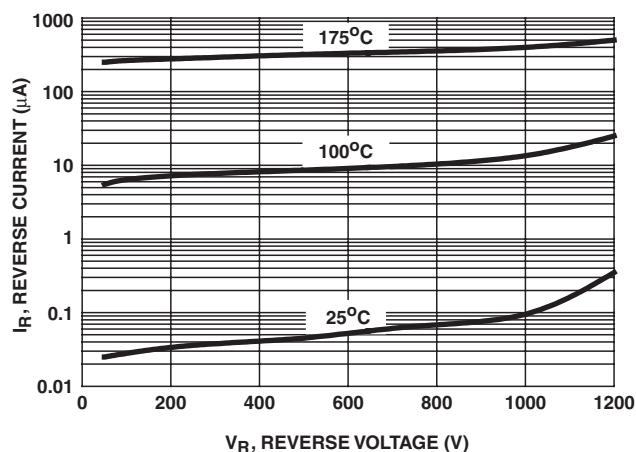


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

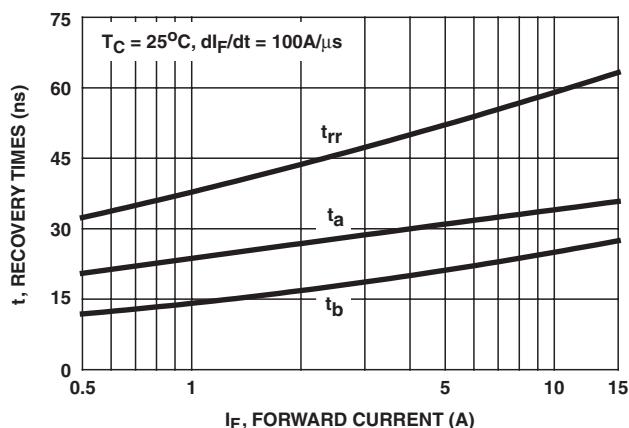
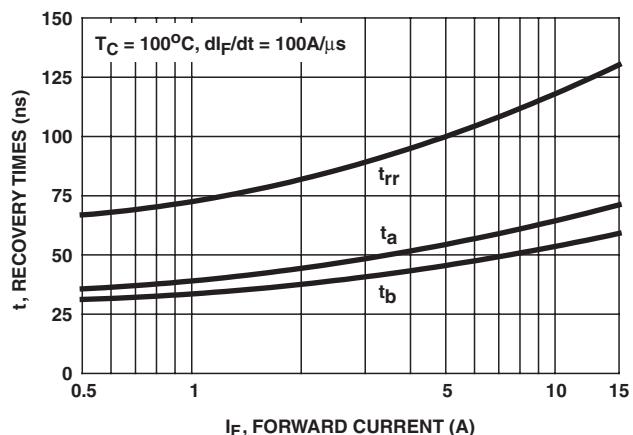
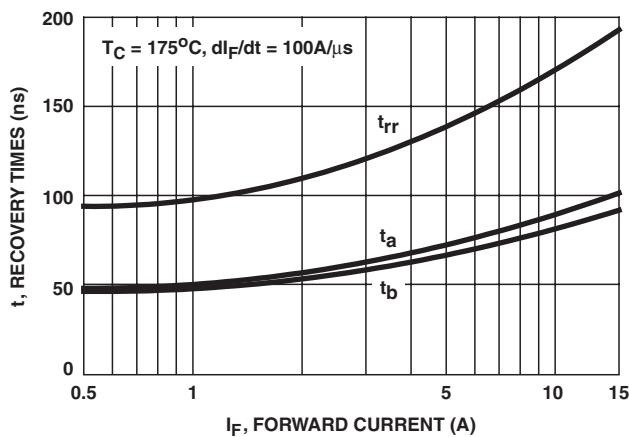
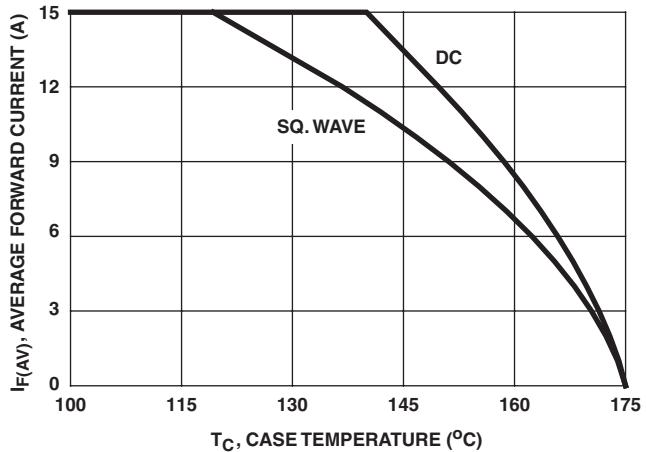
Typical Performance Curves (Continued)FIGURE 3. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENTFIGURE 4. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENTFIGURE 5. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

FIGURE 6. CURRENT DERATING CURVE

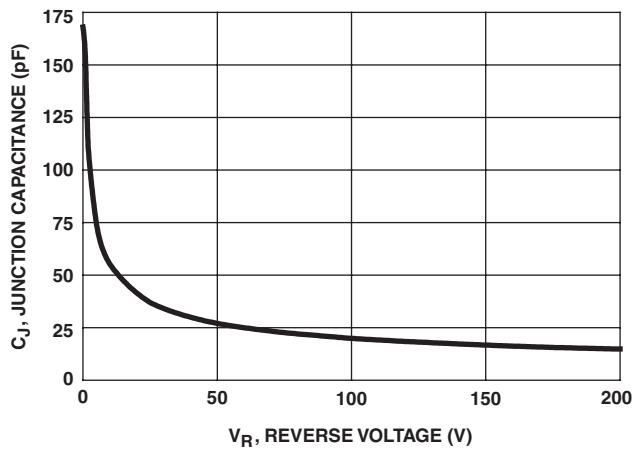
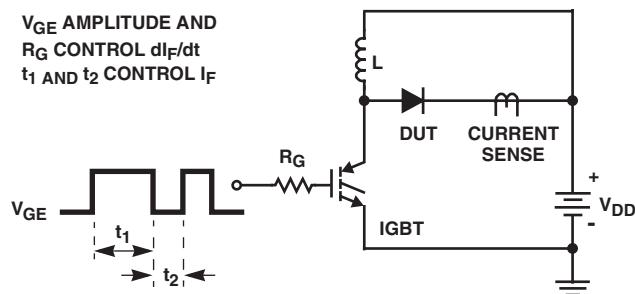
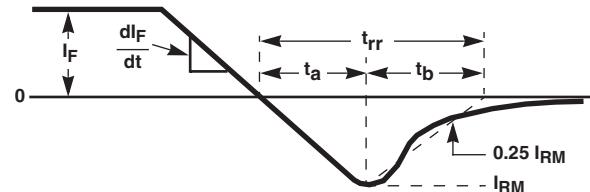


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

FIGURE 8. t_{rr} TEST CIRCUITFIGURE 9. t_{rr} WAVEFORMS AND DEFINITIONS

I_{MAX} = 1A
L = 40mH
R < 0.1Ω
E_{AVL} = 1/2L² [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]
Q₁ = IGBT (BV_{CES} > DUT V_{R(AVL)})

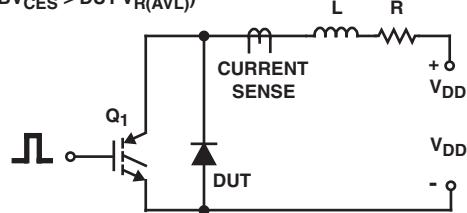


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

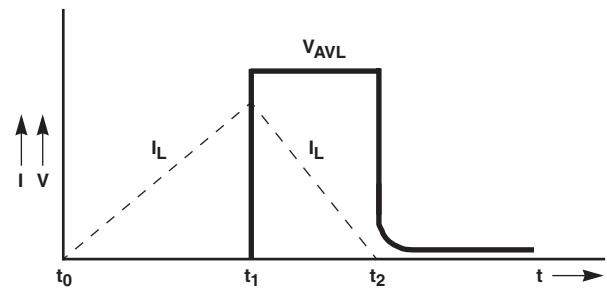


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACE TM	FAST [®]	OPTOLOGIC TM	SMART START TM	VCX TM
Bottomless TM	FASTR TM	OPTOPLANAR TM	STAR*POWER TM	
CoolFET TM	FRFET TM	PACMAN TM	Stealth TM	
CROSSVOLT TM	GlobalOptoisolator TM	POP TM	SuperSOT TM -3	
DenseTrench TM	GTOT TM	Power247 TM	SuperSOT TM -6	
DOME TM	HiSeC TM	PowerTrench [®]	SuperSOT TM -8	
EcoSPARK TM	ISOPLANAR TM	QFET TM	SyncFET TM	
E ² CMOS TM	LittleFET TM	QS TM	TinyLogic TM	
EnSigna TM	MicroFET TM	QT Optoelectronics TM	TruTranslation TM	
FACT TM	MicroPak TM	Quiet Series TM	UHC TM	
FACT Quiet Series TM	MICROWIRE TM	SILENT SWITCHER [®]	UltraFET [®]	

STAR*POWER is used under license

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.

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 herein:

1. 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, or (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 significant injury to the user.
2. A critical component is 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.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.