FAIRCHILD SEMICONDUCTOR™

RHRU7570, RHRU7580, RHRU7590, RHRU75100

March 2001

75A, 700V - 1000V Hyperfast Diode

Features

- **Hyperfast with Soft Recovery . . . . . <85ns**
- **Operating Temperature . . . . . +175°C**
- **Reverse Voltage Up To 1000V**
- **Avalanche Energy Rated**
- **Planar Construction**

Applications

- **Switching Power Supplies**
- **Power Switching Circuits**
- **General Purpose**

Description

RHRU7570, RHRU7580, RHRU7590 and RHRU75100 (TA49068) are hyperfast diodes with soft recovery characteristics (t_{RR} < 85ns). They have half the recovery time of ultrafast diodes and are silicon nitride passivated ion-implanted epitaxial planar construction.

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

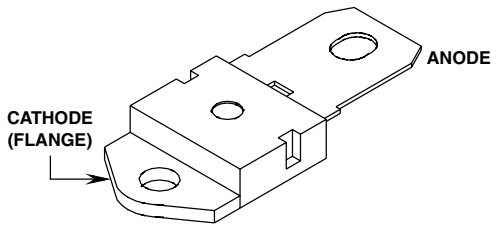
These devices are supplied in the single lead JEDEC style TO-218 plastic package.

Due to space limitations, the brand on the RHRU75100 is abbreviated to HRU75100.

To order this part use the full part number, i.e. RHRU75100.

Package

JEDEC STYLE SINGLE LEAD TO-218
TOP VIEW



Symbol

Absolute Maximum Ratings (T_C = +25°C), Unless Otherwise Specified

	RHRU7570	RHRU7580	RHRU7590	RHRU75100	UNITS
Peak Repetitive Reverse Voltage V_{RRM}	700	800	900	1000	V
Working Peak Reverse Voltage V_{RWM}	700	800	900	1000	V
DC Blocking Voltage V_R	700	800	900	1000	V
Average Rectified Forward Current $I_{F(AV)}$ (T_C = +52°C)	75	75	75	75	A
Repetitive Peak Surge Current I_{FSM} (Square Wave, 20kHz)	150	150	150	150	A
Nonrepetitive Peak Surge Current I_{FSM} (Halfwave, 1 phase, 60Hz)	750	750	750	750	A
Maximum Power Dissipation P_D	190	190	190	190	W
Avalanche Energy (L = 40mH) (See Figures 10 and 11) E_{AVL}	50	50	50	50	mj
Operating and Storage Temperature T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	-65 to +175	°C

Specifications RHRU7570, RHRU7580, RHRU7590, RHRU75100

Electrical Specifications $T_C = +25^oC$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	RHRU7570			RHRU7580			RHRU7590			RHRU75100			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 75A, T_C = +25^oC$	-	-	3.0	-	-	3.0	-	-	3.0	-	-	3.0	V
	$I_F = 75A, T_C = +150^oC$	-	-	2.5	-	-	2.5	-	-	2.5	-	-	2.5	V
I_R	$V_R = 700V, T_C = +25^oC$	-	-	50	-	-	-	-	-	-	-	-	-	µA
	$V_R = 800V, T_C = +25^oC$	-	-	-	-	-	50	-	-	-	-	-	-	µA
	$V_R = 900V, T_C = +25^oC$							-	-	50				µA
	$V_R = 1000V, T_C = +25^oC$	-	-	-	-	-	-	-	-	-	-	-	50	µA
I_R	$V_R = 700V, T_C = +150^oC$	-	-	2.0	-	-	-	-	-	-	-	-	-	mA
	$V_R = 800V, T_C = +150^oC$	-	-	-	-	-	2.0	-	-	-	-	-	-	mA
	$V_R = 900V, T_C = +150^oC$							-	-	2.0				mA
	$V_R = 1000V, T_C = +150^oC$	-	-	-	-	-	-	-	-	-	-	-	2.0	mA
t_{RR}	$I_F = 1A, dI_F/dt = 100A/µs$	-	-	85	-	-	85	-	-	85	-	-	85	ns
	$I_F = 75A, dI_F/dt = 100A/µs$	-	-	100	-	-	100	-	-	100	-	-	100	ns
t_A	$I_F = 75A, dI_F/dt = 100A/µs$	-	55	-	-	55	-	-	55	-	-	55	-	ns
t_B	$I_F = 75A, dI_F/dt = 100A/µs$	-	40	-	-	40	-	-	40	-	-	40	-	ns
Q_{RR}	$I_F = 75A, dI_F/dt = 100A/µs$	-	240	-	-	240	-	-	240	-	-	240	-	nC
C_J	$V_R = 10V, I_F = 0A$	-	220	-	-	220	-		220		-	220	-	pF
$R_{\theta JC}$		-	-	0.8	-	-	0.8			0.8	-	-	0.8	$^oC/W$

DEFINITIONS

V_F = Instantaneous Forward Voltage (pw = 300µs, D = 2%)

I_R = Instantaneous Reverse Current

t_{RR} = Reverse Recovery Time (Figure 2), Summation of $t_A + t_B$

t_A = Time to Reach Peak Reverse Current (See Figure 2).

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 2)

Q_{RR} = Reverse Recovery Charge

C_J = Junction Capacitance

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

pw = Pulse Width

D = Duty Cycle

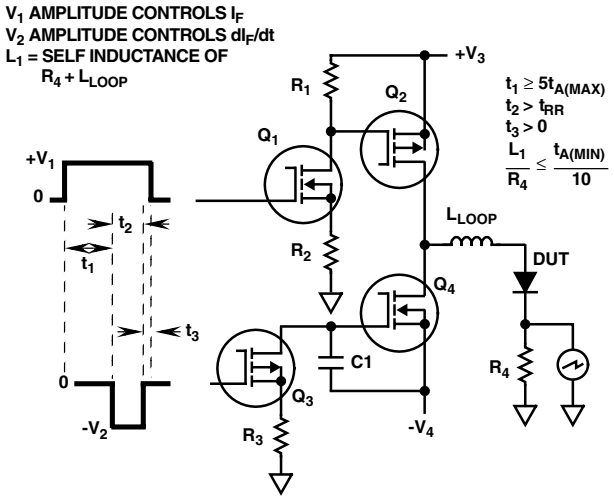


FIGURE 1. t_{RR} TEST CIRCUIT

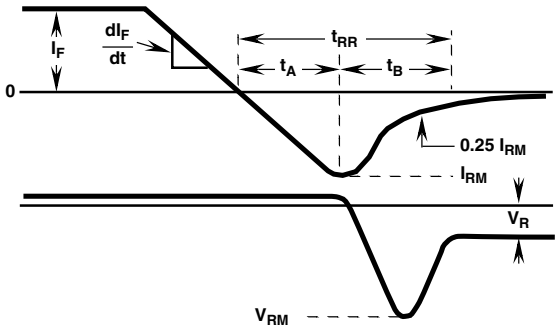


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

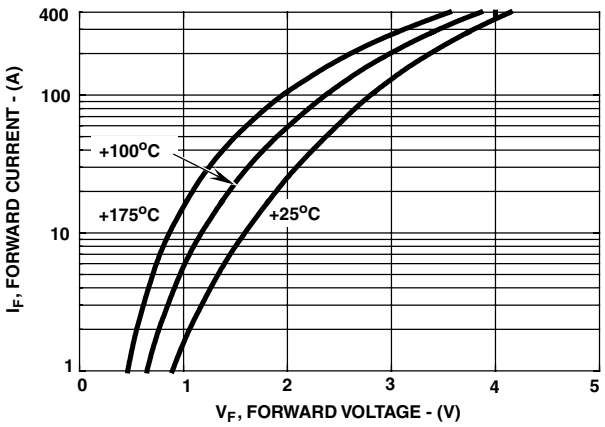


FIGURE 3. TYPICAL FORWARD CURRENT vs. FORWARD VOLTAGE DROP

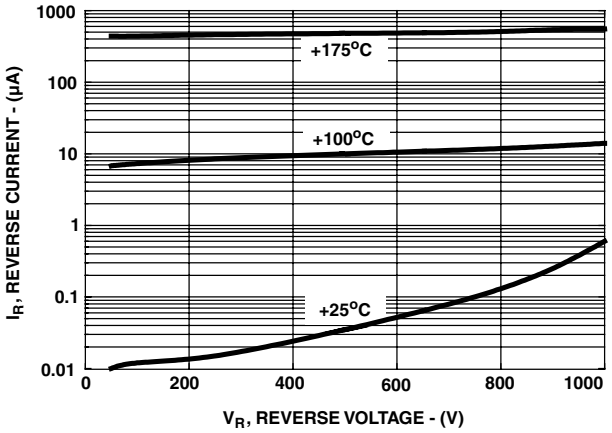


FIGURE 4. TYPICAL REVERSE CURRENT vs. REVERSE VOLTAGE

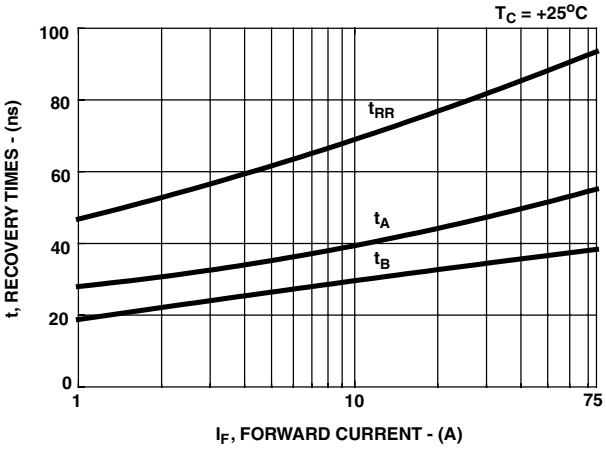


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs. FORWARD CURRENT AT +25°C

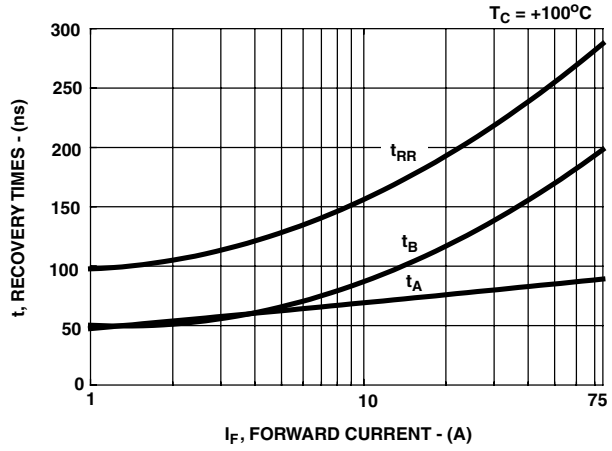


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs. FORWARD CURRENT AT +100°C

Typical Performance Curves (Continued)

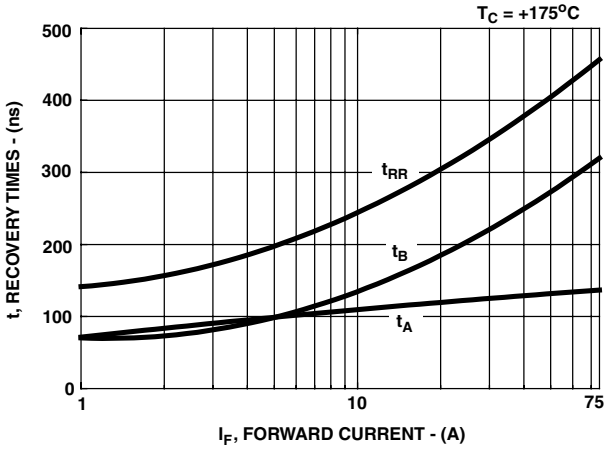


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs. FORWARD CURRENT AT +175°C

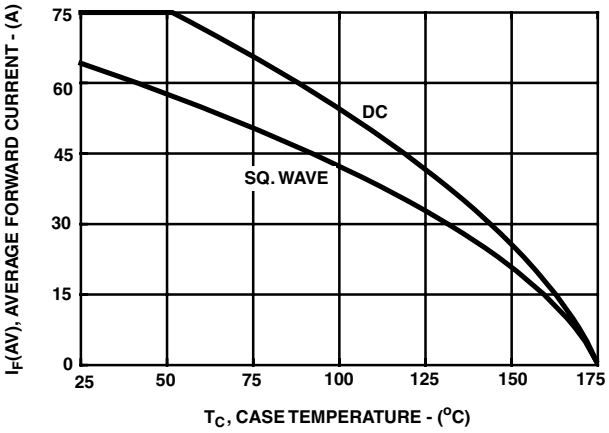


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

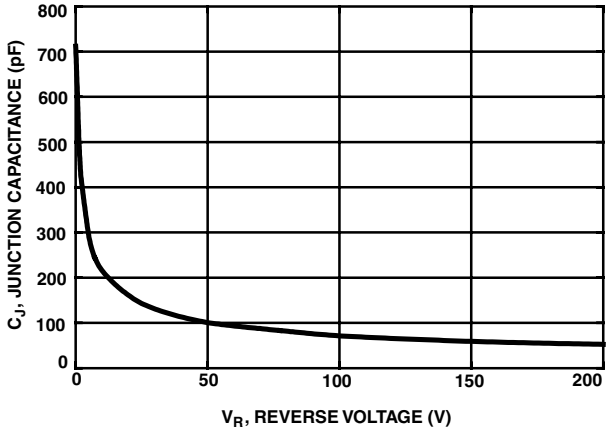


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs. REVERSE VOLTAGE

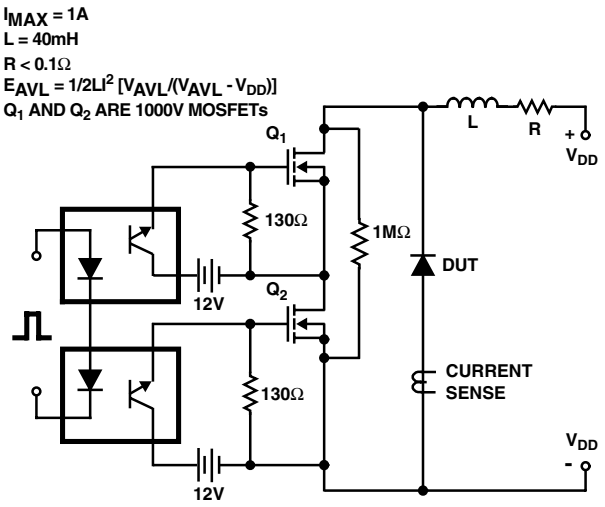


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

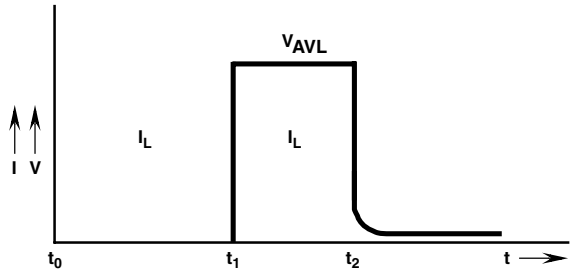
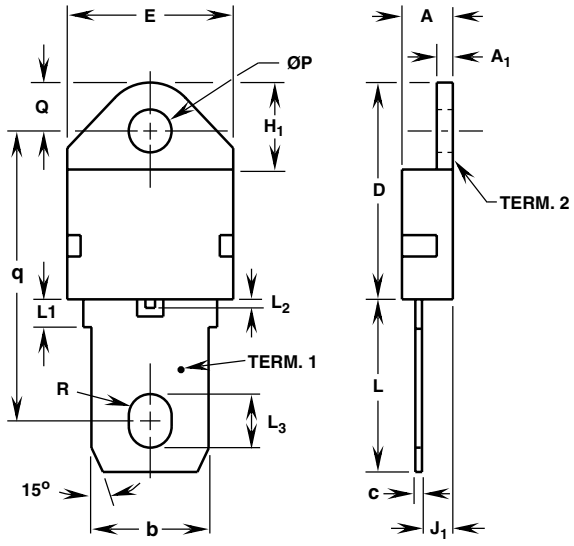


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Packaging (Continued)



TO-218

SINGLE LEAD JEDEC STYLE TO-218 PLASTIC PACKAGE

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.185	0.195	4.70	4.95	-
A_1	0.058	0.062	1.48	1.57	-
b	0.433	0.443	11.00	11.25	-
c	0.018	0.022	0.46	0.55	-
D	0.800	0.820	20.32	20.82	-
E	0.615	0.625	15.63	15.87	2
H_1	-	0.330	-	8.38	-
J_1	0.115	0.125	2.93	3.17	4
L	0.635	0.655	16.13	16.63	-
L_1	-	0.130	-	3.30	-
L_2	-	0.034	-	0.86	-
L_3	0.195	0.205	4.96	5.20	-
ØP	0.159	0.163	4.04	4.14	-
Q	0.176	0.186	4.48	4.72	2
q	1.080	1.088	27.44	27.63	-
R	0.078	0.082	1.99	2.08	-

NOTES:

1. No current JEDEC outline for this package.
2. Tab outline optional within boundaries of dimensions E and Q.
3. Maximum radius of 0.050 inches (1.27mm) on all body edges and corners.
4. Position of lead to be measured 0.100 inches (2.54mm) from bottom of dimension D.
5. Controlling dimension: Inch.
6. Revision 1 dated 1-93.

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