HARRIS SEMICONDUCTOR

RHRU150120

September 1995

150A, 1200V Hyperfast Diode

Features

- Hyperfast with Soft Recovery . . . . <100ns
- Operating Temperature . . . . +175^{o}C
- Reverse Voltage 1200V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplier
- Power Switching Circuits
- General Purpose

Description

The RHRU150120 are hyperfast diodes with soft recovery characteristics (t_{RR} < 100ns). 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.

PACKAGE AVAILABILITY

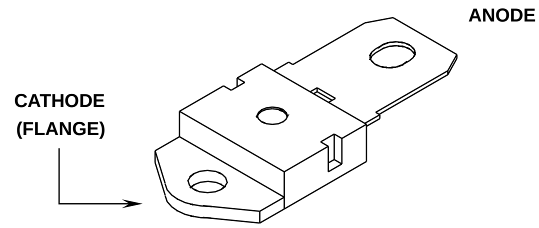
PART NUMBER	PACKAGE	BRAND
RHRU150120	TO-218	RHR150120

NOTE: When ordering, use the entire part number.

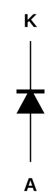
Formerly developmental type TA49074.

Package

SINGLE LEAD JEDEC STYLE TO-218



Symbol



Absolute Maximum Ratings T_C = +25^{o}C, Unless Otherwise Specified

		RHRU150120	UNITS
Peak Repetitive Reverse Voltage	V_{RRM}	1200	V
Working Peak Reverse Voltage	V_{RWM}	1200	V
DC Blocking Voltage	V_R	1200	V
Average Rectified Forward Current T_C = 37.5^{o}C	$I_{F(AV)}$	150	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	300	A
Nonrepetitive Peak Surge Current (Halfwave, 1 phase, 60Hz)	I_{FSM}	1500	A
Maximum Power Dissipation	P_D	375	W
Avalanche Energy (See Figures 10 and 11)	E_{AVL}	50	mj
Operating and Storage Temperature	T_{STG}, T_J	-65 to +175	^{o}C

File Number **4049**

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

SYMBOL	TEST CONDITION	RHRU150120 LIMITS MIN	TYP	MAX	UNITS
V_F	$I_F = 150A$, $T_C = +25^oC$	-	-	3.2	V
	$I_F = 150A$, $T_C = +150^oC$	-	-	2.6	V
I_R	$V_R = 1200V$, $T_C = +25^oC$	-	-	250	µA
	$V_R = 1200V$, $T_C = +150^oC$	-	-	3.0	mA
t_{RR}	$I_F = 1A$, $dI_F/dt = 200A/\mu s$	-	-	100	ns
	$I_F = 150A$, $dI_F/dt = 200A/\mu s$	-	-	125	ns
t_A	$I_F = 150A$, $dI_F/dt = 200A/\mu s$	-	70	-	ns
t_B	$I_F = 150A$, $dI_F/dt = 200A/\mu s$	-	40	-	ns
Q_{RR}	$I_F = 150A$, $dI_F/dt = 200A/\mu s$	-	460	-	nC
C_J	$V_R = 10V$, $I_F = 0A$	-	420	-	pF
$R_{\theta JC}$		-	-	0.4	$^oC/W$

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300µs, D = 2%).
I_R = Instantaneous reverse current.
t_{RR} = Reverse recovery time (See 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.
E_{AVL} = Controlled Avalanche Energy (See Figures 10 and 11).
pw = pulse width.
D = duty cycle.

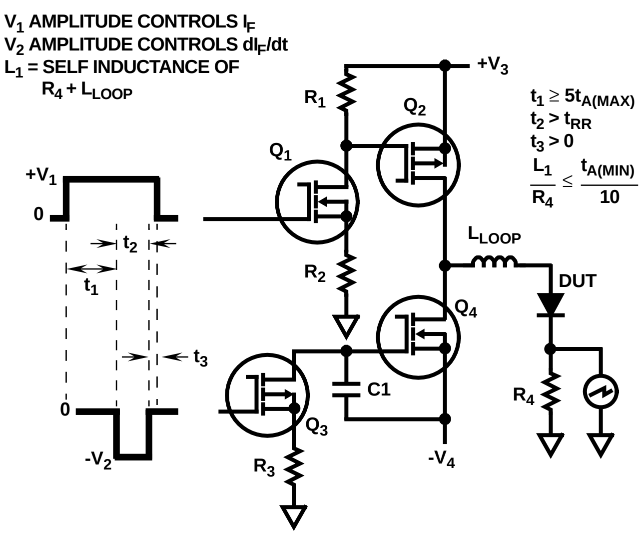


FIGURE 1. t_{RR} TEST CIRCUIT

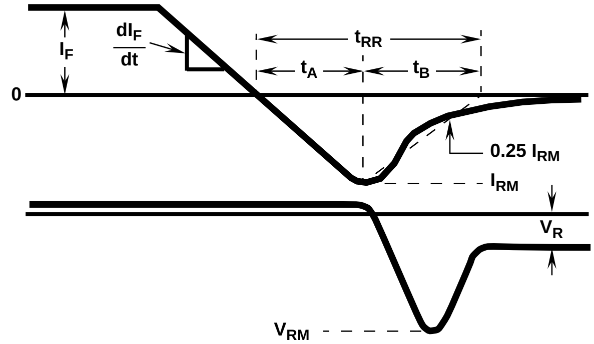


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

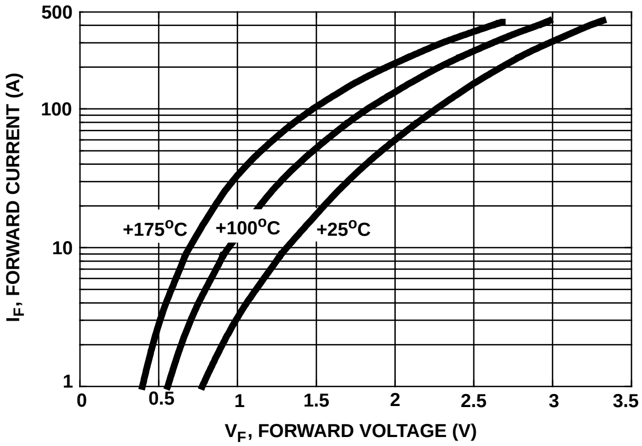


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

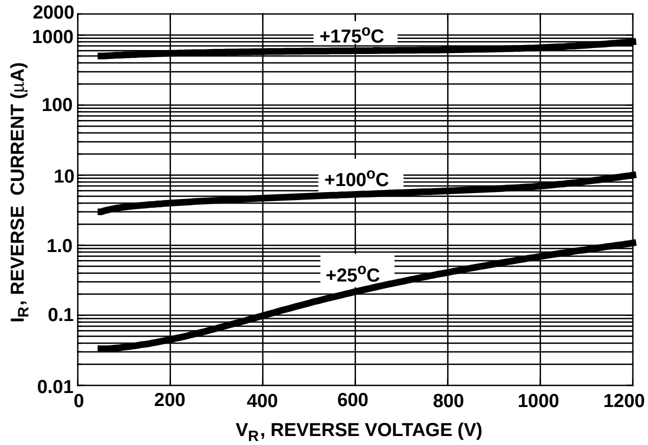


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

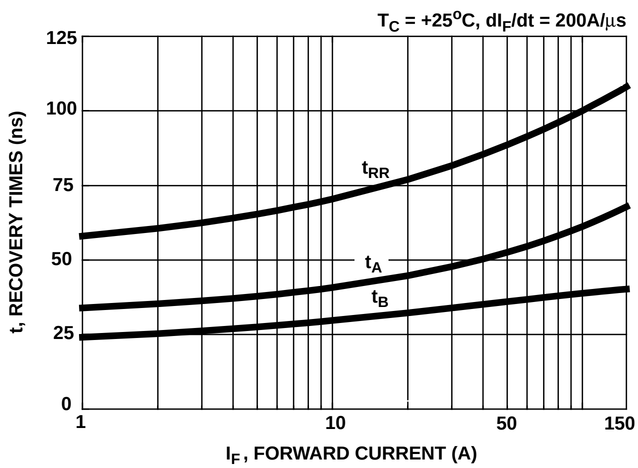


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 25°C

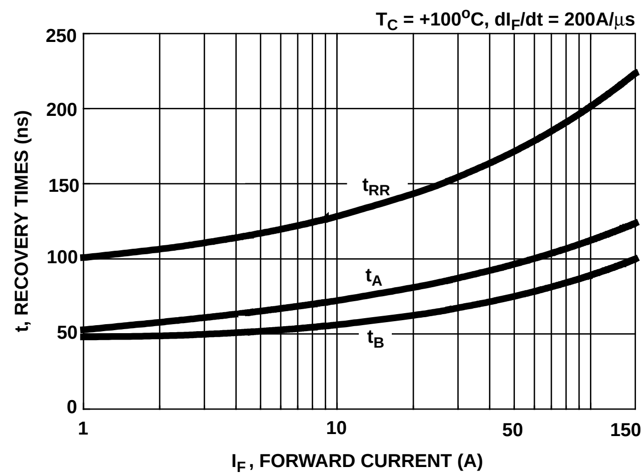


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 100°C

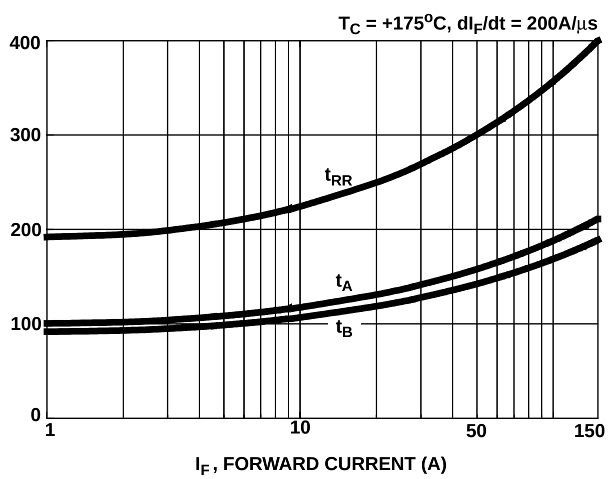


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 175°C

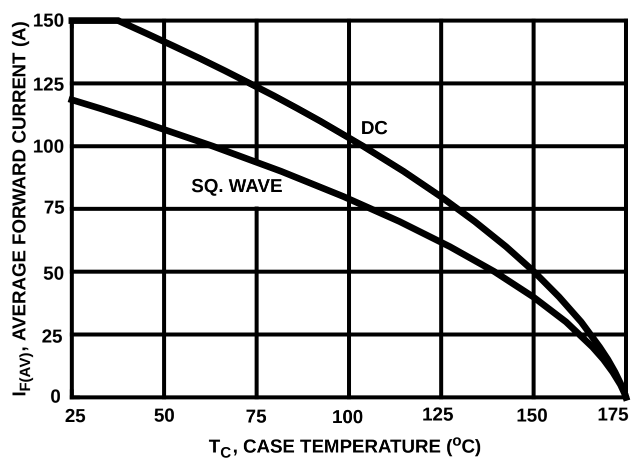


FIGURE 8. CURRENT DERATING CURVE

Typical Performance Curves (Continued)

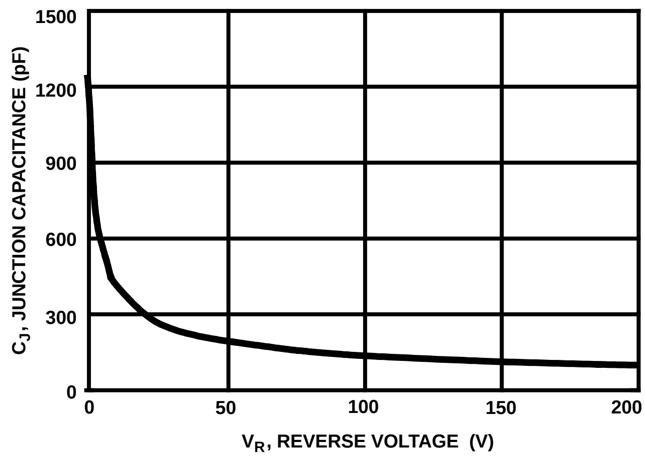


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

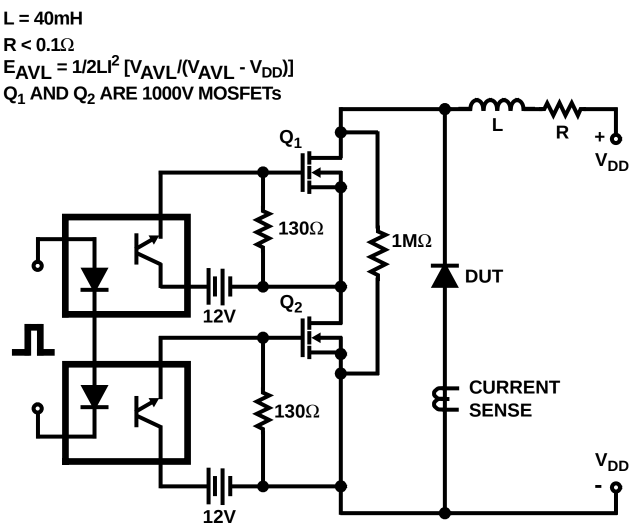


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

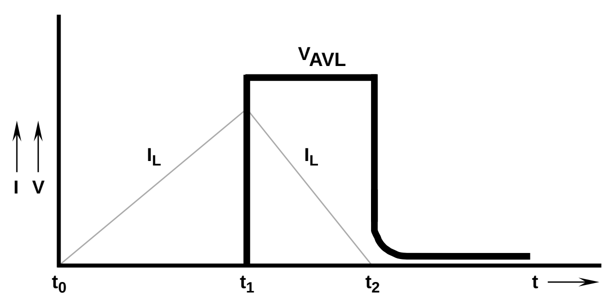
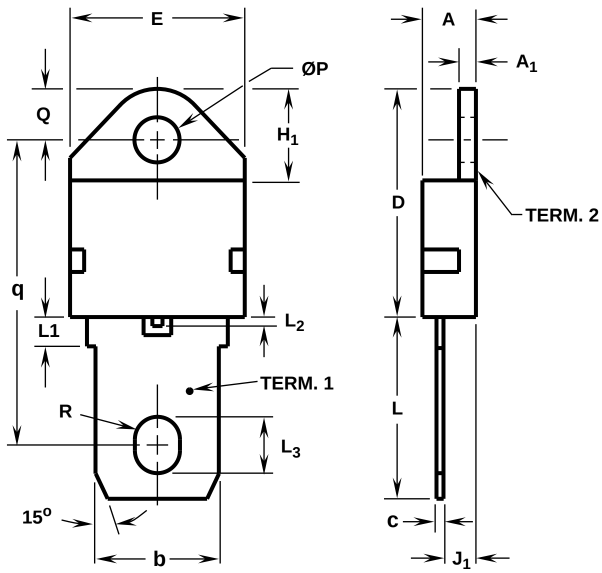


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Packaging



TERM 1 - ANODE

TERM 2 - CATHODE

TO-218

SINGLE LEAD JEDEC STYLE TO-218 PLASTIC PACKAGE

SYMBOL	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX	NOTES
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.

All Harris Semiconductor products are manufactured, assembled and tested under **ISO9000** quality systems certification.

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