

March 1995

6A, 1200V Hyperfast Diodes

## Features

- Hyperfast with Soft Recovery .....<55ns
- Operating Temperature .....+175°C
- Reverse Voltage .....1200V
- Avalanche Energy Rated
- Planar Construction

## Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

## Description

The RHRD6120 and RHRD6120S (TA49058) are hyperfast diodes with soft recovery characteristics ( $t_{RR} < 55\text{ns}$ ). 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.

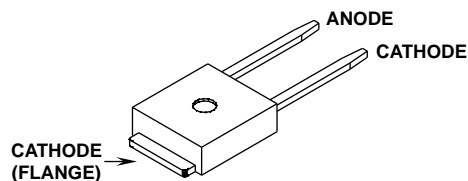
### PACKAGE AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RHRD6120	TO-251	HR6120
RHRD6120S	TO-252	HR6120

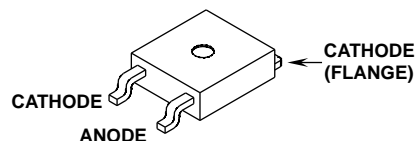
NOTE: When ordering, use the entire part number.

## Package

JEDEC STYLE TO-251



JEDEC STYLE TO-252



## Symbol



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

	RHRD6120 RHRD6120S	UNITS
Peak Repetitive Reverse Voltage .....	1200	V
Working Peak Reverse Voltage .....	1200	V
DC Blocking Voltage .....	1200	V
Average Rectified Forward Current .....	6	A
( $T_C = 130^\circ\text{C}$ )		
Repetitive Peak Surge Current .....	12	A
(Square Wave, 20kHz)		
Nonrepetitive Peak Surge Current .....	60	A
(Halfwave, 1 Phase, 60Hz)		
Maximum Power Dissipation .....	50	W
Avalanche Energy (See Figures 10 and 11) .....	10	mJ
Operating and Storage Temperature .....	-65 to +175	°C

## Specifications RHRD6120, RHRD6120S

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
$V_F$	$I_F = 6\text{A}$ , $T_C = +25^\circ\text{C}$	-	-	3.2	V
	$I_F = 6\text{A}$ , $T_C = +150^\circ\text{C}$	-	-	2.6	V
$I_R$	$V_R = 1200\text{V}$ , $T_C = +25^\circ\text{C}$	-	-	100	$\mu\text{A}$
	$V_R = 1200\text{V}$ , $T_C = +150^\circ\text{C}$	-	-	500	$\mu\text{A}$
$t_{RR}$	$I_F = 1\text{A}$ , $dI_F/dt = 200\text{A}/\mu\text{s}$	-	-	55	ns
	$I_F = 6\text{A}$ , $dI_F/dt = 200\text{A}/\mu\text{s}$	-	-	65	ns
$t_A$	$I_F = 6\text{A}$ , $dI_F/dt = 200\text{A}/\mu\text{s}$	-	33	-	ns
$t_B$	$I_F = 6\text{A}$ , $dI_F/dt = 200\text{A}/\mu\text{s}$	-	22	-	ns
$Q_{RR}$	$I_F = 6\text{A}$ , $dI_F/dt = 200\text{A}/\mu\text{s}$	-	210	-	nC
$C_J$	$V_R = 10\text{V}$ , $I_F = 0\text{A}$	-	22	-	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 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).

$p_w$  = pulse width.

$D$  = duty cycle.

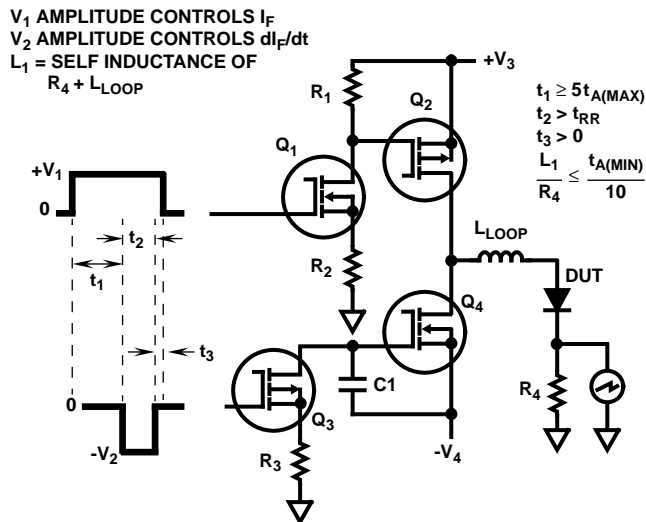


FIGURE 1.  $t_{RR}$  TEST CIRCUIT

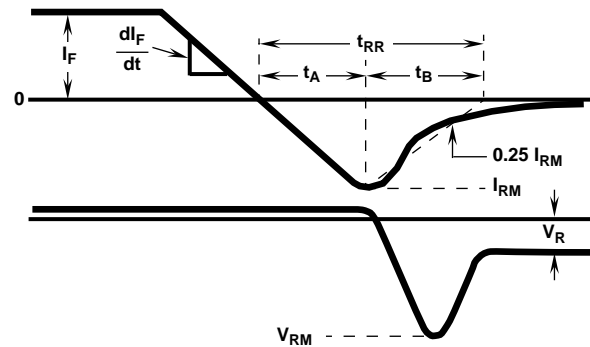


FIGURE 2.  $t_{RR}$  WAVEFORMS AND DEFINITIONS

# Typical Performance Curves

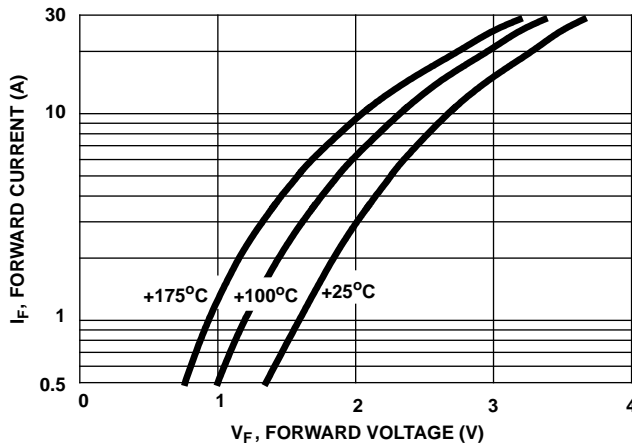


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

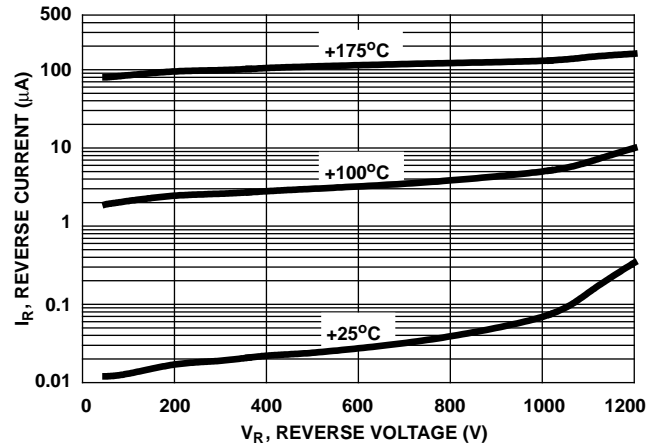


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

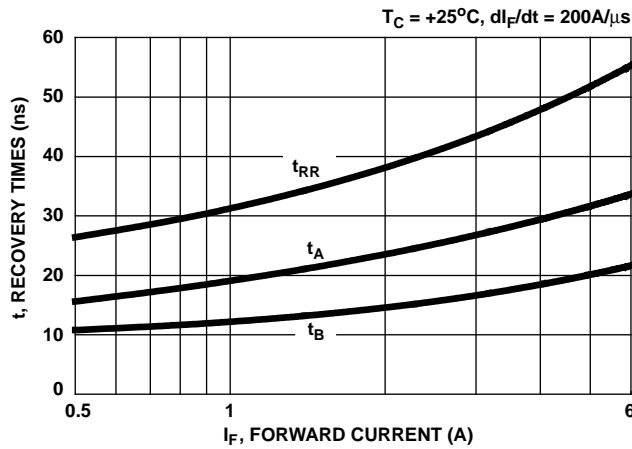


FIGURE 5. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT AT 25°C

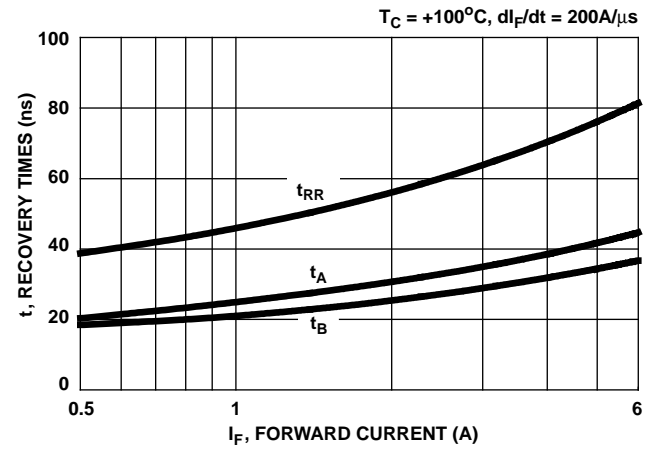


FIGURE 6. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT AT 100°C

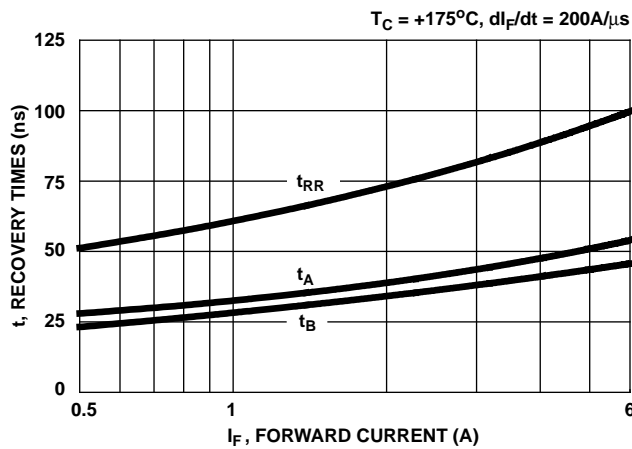


FIGURE 7. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT AT 175°C

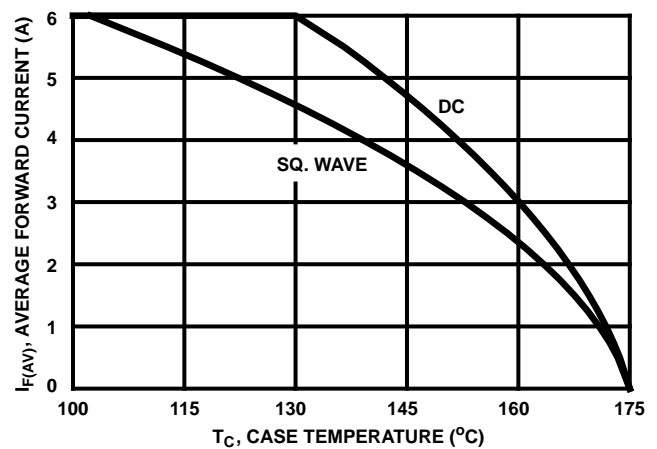


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

# Typical Performance Curves (Continued)

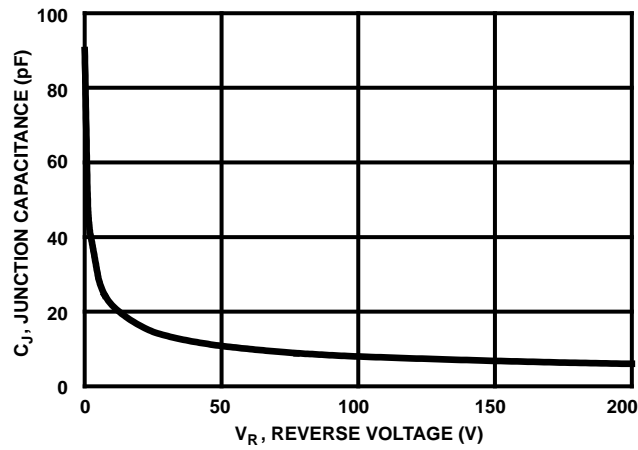


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

## Test Circuit and Waveforms

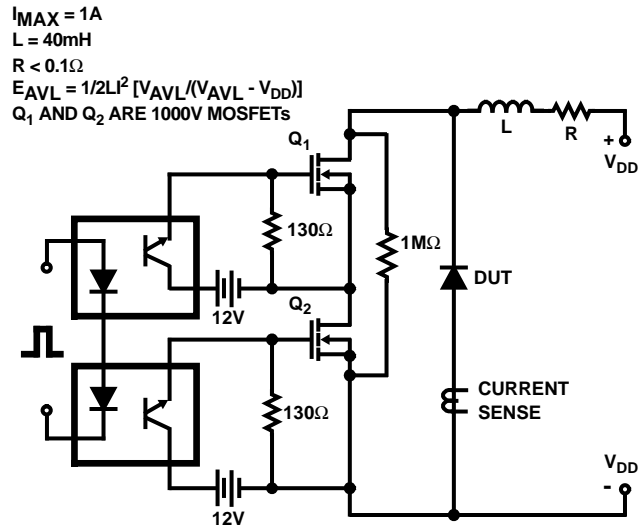


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

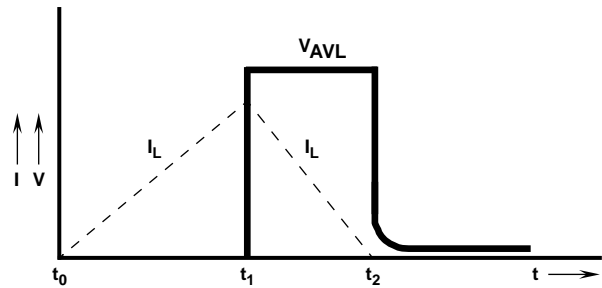


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS