

# RHRG7570, RHRG7580, RHRG7590, RHRG75100

January 2002

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

RHRG7570, RHRG7580, RHRG7590 and RHRG75100 (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.

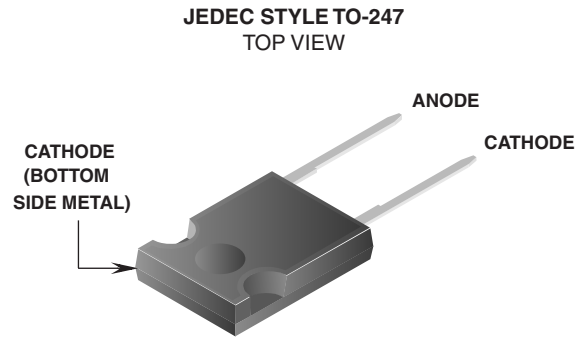
These devices are intended for use as freewheeling/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and hyperfast soft recovery minimize ringing and electrical noise in many power switching circuits reducing power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

These devices are supplied in the 2 lead JEDEC style TO-247 plastic package.

Due to space limitations, the brand on the RHRG75100 is abbreviated to HRG75100.

To order this part use the full part number, i.e. RHRG75100.

## Package



## Symbol



## Absolute Maximum Ratings ( $T_C = +25^\circ C$ ), Unless Otherwise Specified

	RHRG7570	RHRG7580	RHRG7590	RHRG75100	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 $I_{F(AV)}$ ( $T_C = +52^\circ C$ )	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 RHRG7570, RHRG7580, RHRG7590, RHRG75100

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

SYMBOL	TEST CONDITION	RHRG7570			RHRG7580			RHRG7590			RHRG75100			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
$V_F$	$I_F = 75\text{A}, T_C = +25^\circ\text{C}$	-	-	3.0	-	-	3.0	-	-	3.0	-	-	3.0	V
	$I_F = 75\text{A}, T_C = +150^\circ\text{C}$	-	-	2.5	-	-	2.5	-	-	2.5	-	-	2.5	V
$I_R$	$V_R = 700\text{V}, T_C = +25^\circ\text{C}$	-	-	50	-	-	-	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 800\text{V}, T_C = +25^\circ\text{C}$	-	-	-	-	-	50	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 900\text{V}, T_C = +25^\circ\text{C}$	-	-	-	-	-	-	-	-	50	-	-	-	$\mu\text{A}$
	$V_R = 1000\text{V}, T_C = +25^\circ\text{C}$	-	-	-	-	-	-	-	-	-	-	-	50	$\mu\text{A}$
$I_R$	$V_R = 700\text{V}, T_C = +150^\circ\text{C}$	-	-	2.0	-	-	-	-	-	-	-	-	-	mA
	$V_R = 800\text{V}, T_C = +150^\circ\text{C}$	-	-	-	-	-	2.0	-	-	-	-	-	-	mA
	$V_R = 900\text{V}, T_C = +150^\circ\text{C}$	-	-	-	-	-	-	-	-	2.0	-	-	-	mA
	$V_R = 1000\text{V}, T_C = +150^\circ\text{C}$	-	-	-	-	-	-	-	-	-	-	-	2.0	mA
$t_{RR}$	$I_F = 1\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	-	85	-	-	85	-	-	85	-	-	85	ns
	$I_F = 75\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	-	100	-	-	100	-	-	100	-	-	100	ns
$t_A$	$I_F = 75\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	55	-	-	55	-	-	55	-	-	55	-	ns
$t_B$	$I_F = 75\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	40	-	-	40	-	-	40	-	-	40	-	ns
$Q_{RR}$	$I_F = 75\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	240	-	-	240	-	-	240	-	-	240	-	nC
$C_J$	$V_R = 10\text{V}, I_F = 0\text{A}$	-	220	-	-	220	-	-	220	-	-	220	-	pF
$R_{\theta JC}$		-	-	0.8	-	-	0.8	-	-	0.8	-	-	0.8	$^\circ\text{C}/\text{W}$

#### DEFINITIONS

$V_F$  = Instantaneous Forward Voltage ( $pw = 300\mu\text{s}$ ,  $D = 2\%$ )

$I_R$  = 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

$V_1$  AMPLITUDE CONTROLS  $i_F$   
 $V_2$  AMPLITUDE CONTROLS  $\frac{di_F}{dt}$   
 $L_1$  = SELF INDUCTANCE OF  
 $R_4 + L_{LOOP}$

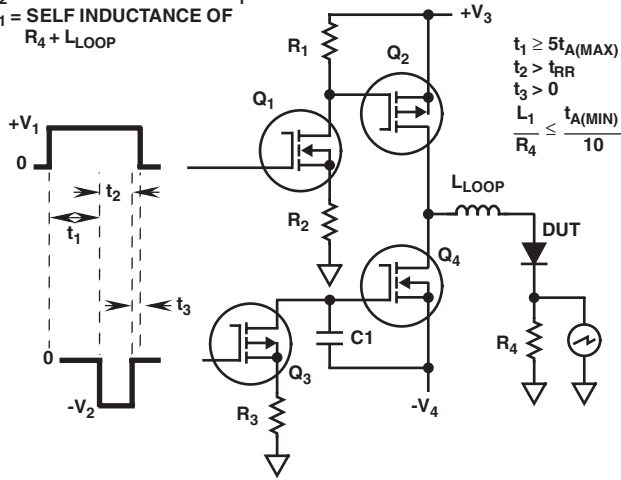


FIGURE 1.  $t_{RR}$  TEST CIRCUIT

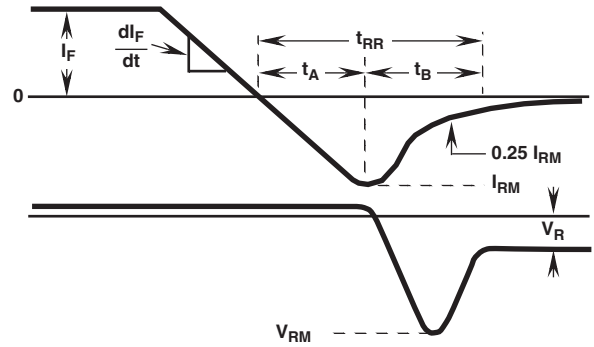


FIGURE 2.  $t_{RR}$  WAVEFORMS AND DEFINITIONS

Typical Performance Curves

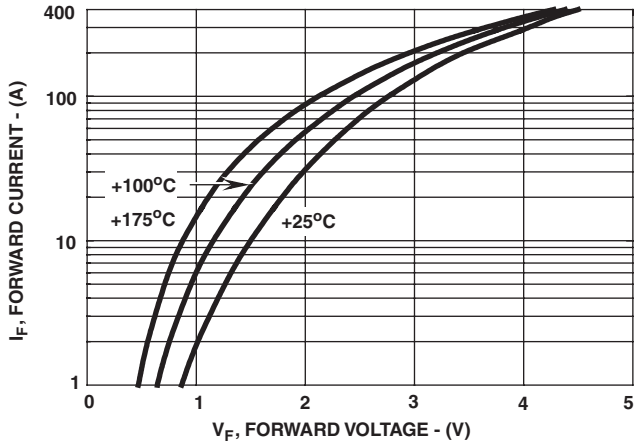


FIGURE 3. TYPICAL FORWARD CURRENT vs. FORWARD VOLTAGE DROP

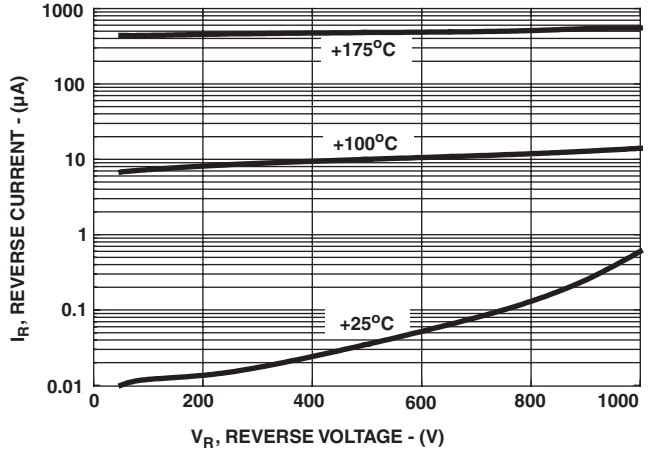


FIGURE 4. TYPICAL REVERSE CURRENT vs. REVERSE VOLTAGE

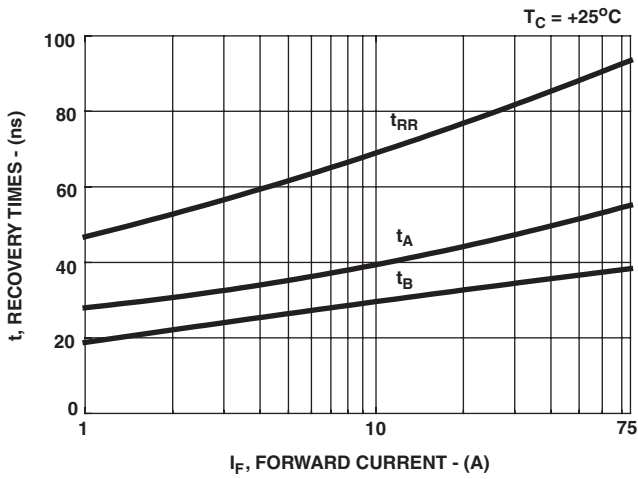


FIGURE 5. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs. FORWARD CURRENT AT +25°C

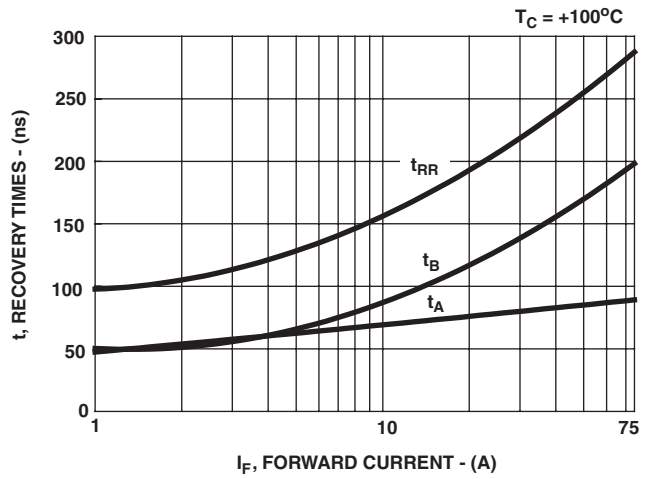


FIGURE 6. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs. FORWARD CURRENT AT +100°C

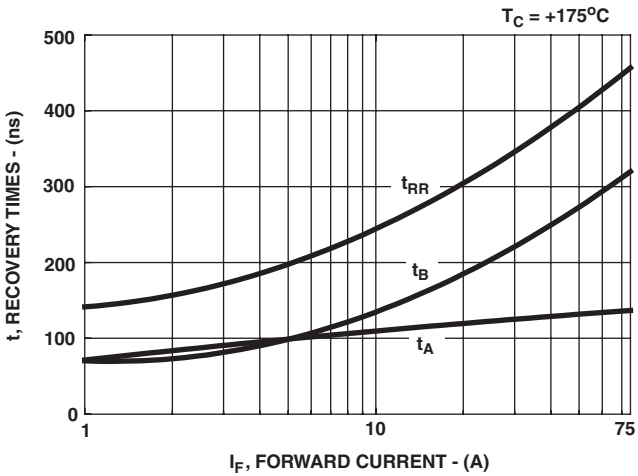


FIGURE 7. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs. FORWARD CURRENT AT +175°C

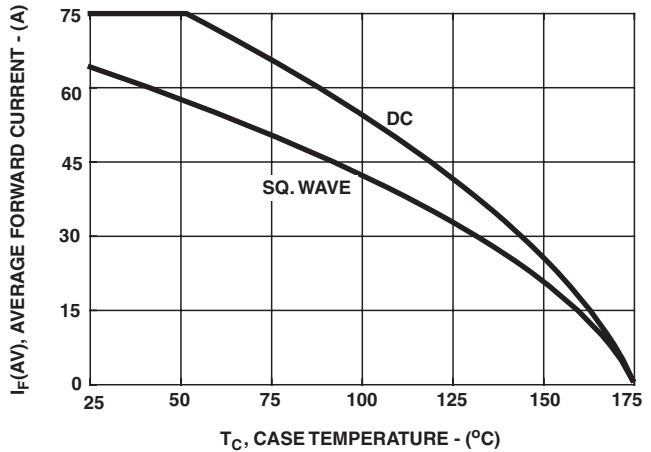


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

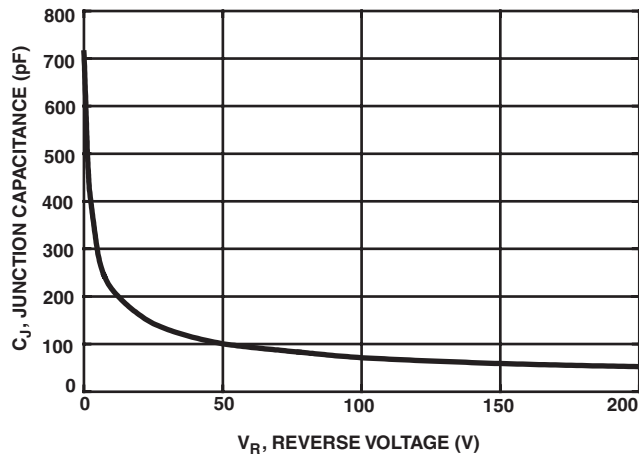


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs. REVERSE VOLTAGE

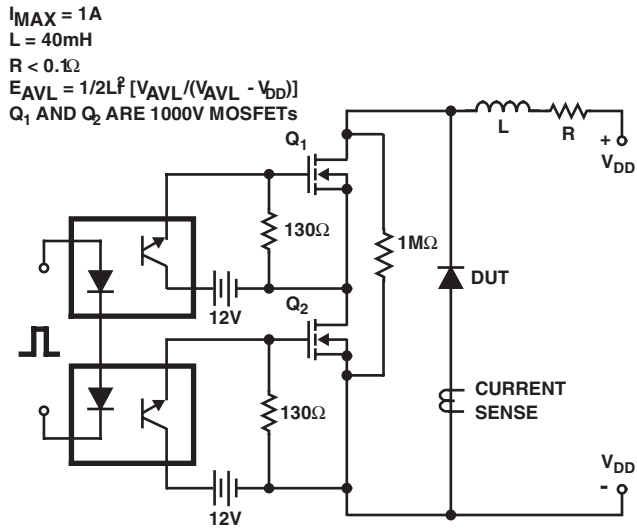


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

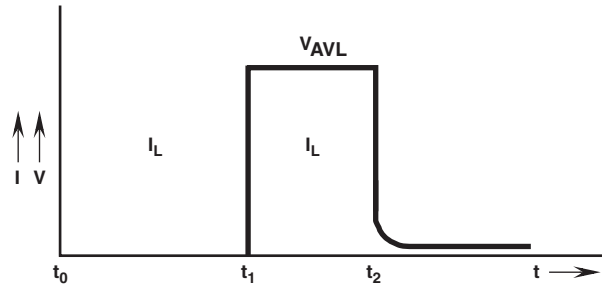


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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