RHRG7570, RHRG7580, RHRG7590, RHRG75100

April 1995

75A, 700V - 1000V Hyperfast Diodes

Features

- **Hyperfast with Soft Recovery . . . . . <85ns**
- **Operating Temperature . . . . . +175^{o}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.

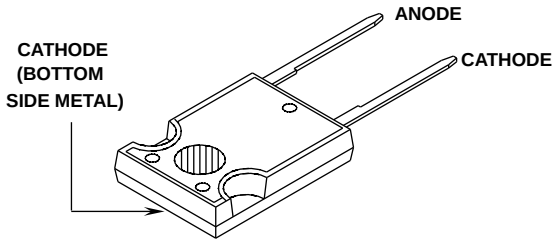
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RHRG7570	TO-247	RHRG7570
RHRG7580	TO-247	RHRG7580
RHRG7590	TO-247	RHRG7590
RHRG75100	TO-247	RHRG75100

NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE TO-247



Symbol

Absolute Maximum Ratings T_C = +25^{o}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 (T_C = +52^{o}C) . . . . . $I_{F(AV)}$	75	75	75	75	A
Repetitive Peak Surge Current (Square Wave, 20kHz) . . . . . I_{FSM}	150	150	150	150	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz) . . . . . I_{FSM}	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	^{o}C

File Number **3923.1**

Electrical Specifications $T_C = +25^oC$, 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 = 75A, T_C = +25°C	-	-	3.0	-	-	3.0	-	-	3.0	-	-	3.0	V
	I_F = 75A, T_C = +150°C	-	-	2.5	-	-	2.5	-	-	2.5	-	-	2.5	V
I_R	V_R = 700V, T_C = +25°C	-	-	500	-	-	-	-	-	-	-	-	-	µA
	V_R = 800V, T_C = +25°C	-	-	-	-	-	500	-	-	-	-	-	-	µA
	V_R = 900V, T_C = +25°C	-	-	-	-	-	-	-	-	500	-	-	-	µA
	V_R = 1000V, T_C = +25°C	-	-	-	-	-	-	-	-	-	-	-	500	µA
I_R	V_R = 700V, T_C = +150°C	-	-	2.0	-	-	-	-	-	-	-	-	-	mA
	V_R = 800V, T_C = +150°C	-	-	-	-	-	2.0	-	-	-	-	-	-	mA
	V_R = 900V, T_C = +150°C	-	-	-	-	-	-	-	-	2.0	-	-	-	mA
	V_R = 1000V, T_C = +150°C	-	-	-	-	-	-	-	-	-	-	-	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	°C/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.

E_{AVL} = Controlled avalanche energy. (See Figures 10 and 11).

pw = pulse width.

D = duty cycle.

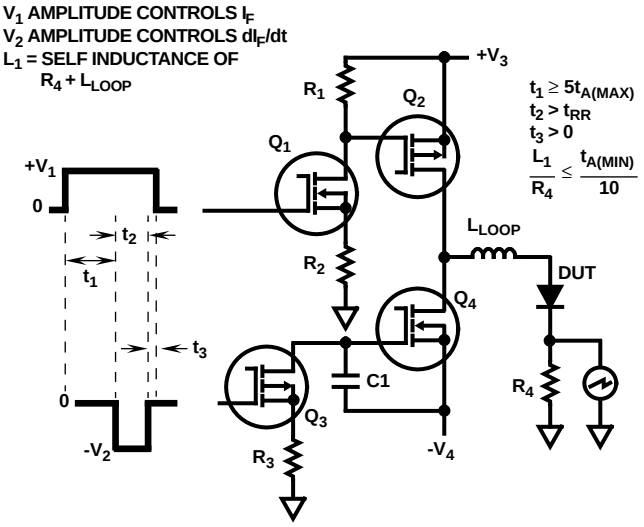


FIGURE 1. t_{RR} TEST CIRCUIT

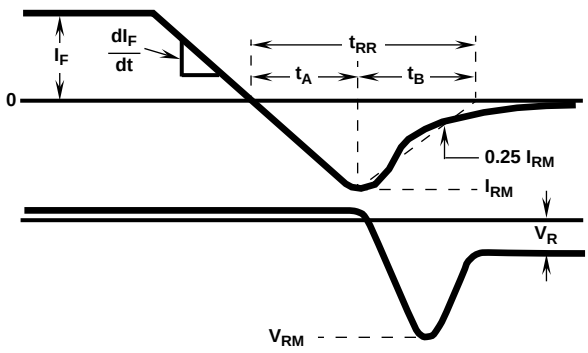


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

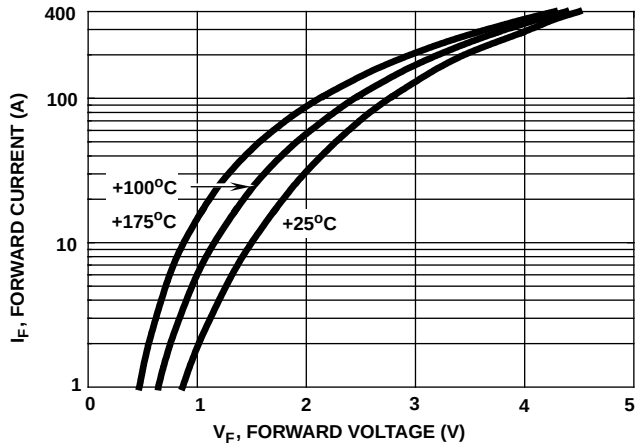


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

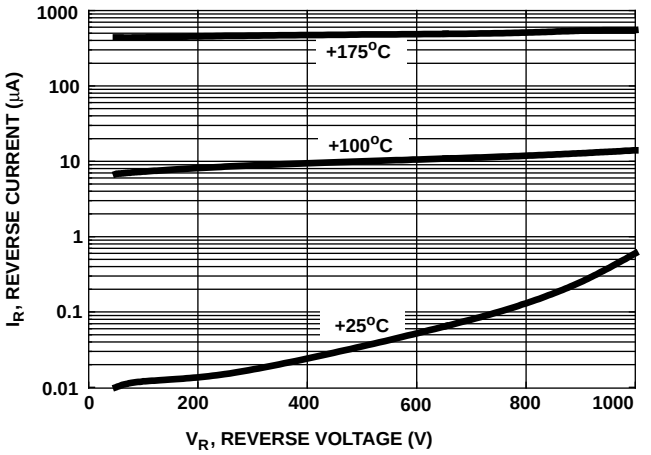


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

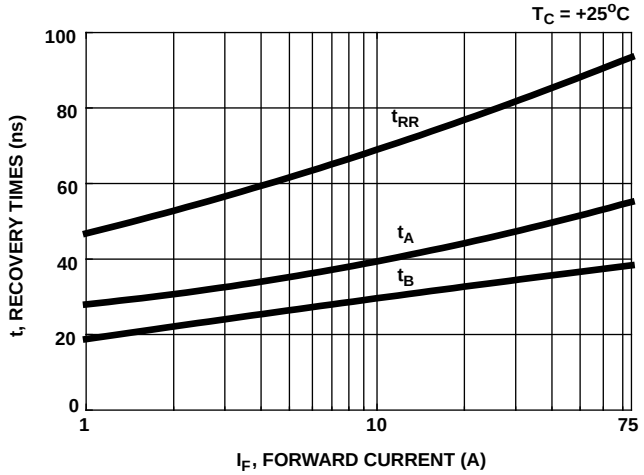


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +25°C

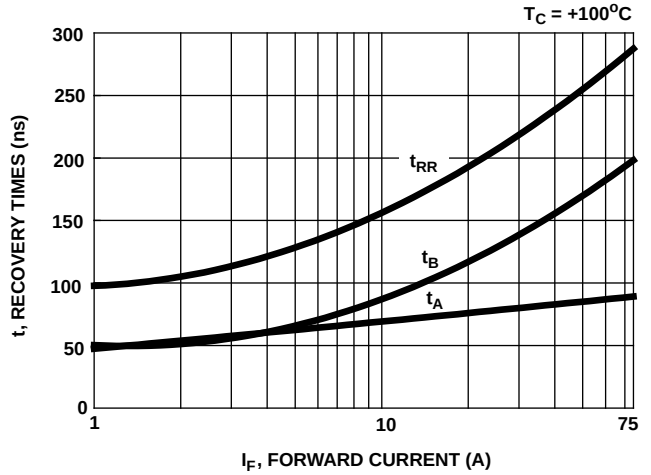


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +100°C

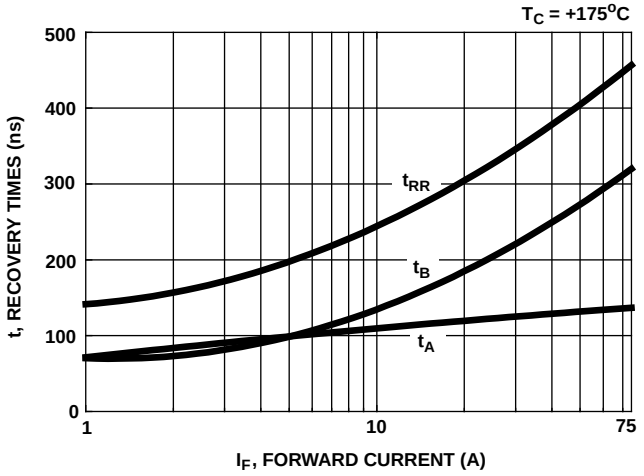


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +175°C

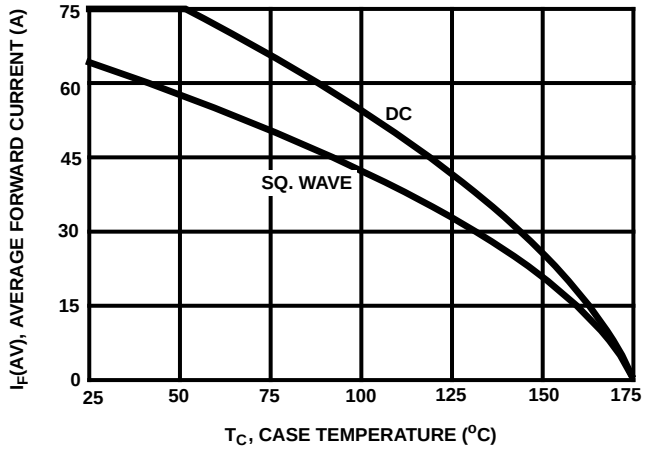


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

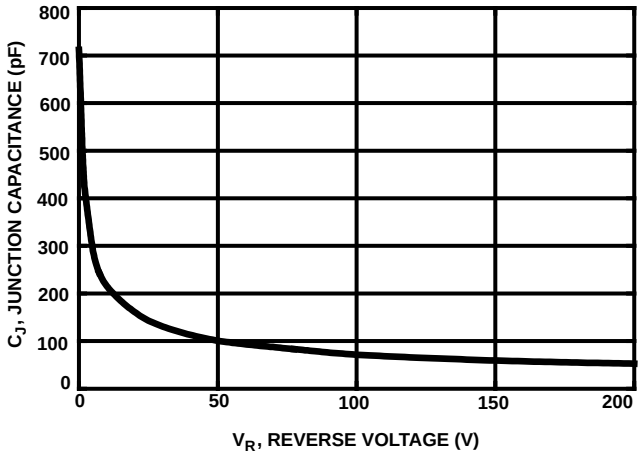


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuit and Waveforms

I_{MAX} = 1A
L = 40mH
R < 0.1Ω
$E_{AVL} = 1/2LI^2 [V_{AVL}/(V_{AVL} - V_{DD})]$
Q_1 AND Q_2 ARE 1000V MOSFETs

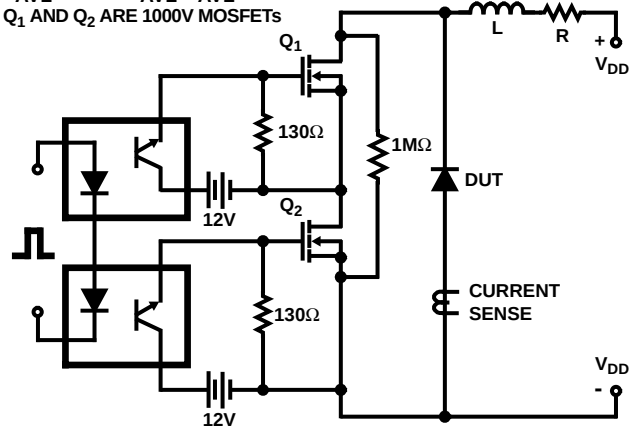


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

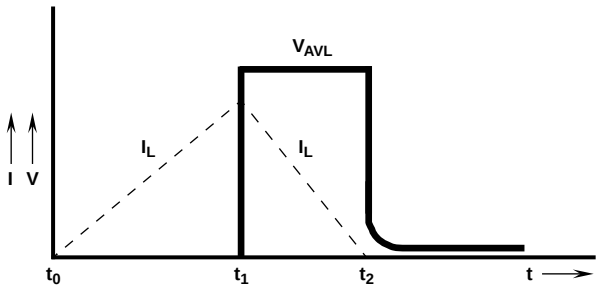


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS