RHRG3070, RHRG3080, RHRG3090, RHRG30100

April 1995

30A, 700V - 1000V Hyperfast Diodes

Features

- Hyperfast with Soft Recovery .... <65ns
- Operating Temperature .... +175°C
- Reverse Voltage Up To 1000V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Description

RHRG3070, RHRG3080, RHRG3090 and RHRG30100 (TA49064) are hyperfast diodes with soft recovery characteristics (t_{RR} < 65ns). 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.

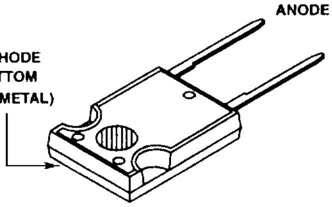
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RHRG3070	TO-247	RHRG3070
RHRG3080	TO-247	RHRG3080
RHRG3090	TO-247	RHRG3090
RHRG30100	TO-247	RHRG30100

NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE TO-247



Symbol

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

		RHRG3070	RHRG3080	RHRG3090	RHRG30100	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 = +95°C)	$I_{F(AV)}$	30	30	30	30	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	70	70	70	70	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz)	I_{FSM}	325	325	325	325	A
Maximum Power Dissipation	P_D	125	125	125	125	W
Avalanche Energy (See Figures 10 and 11)	E_{AVL}	20	20	20	20	mj
Operating and Storage Temperature	T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	-65 to +175	°C

Electrical Specifications T_C = +25°C, Unless Otherwise Specified

SYMBOL	TEST CONDITION	RHRG3070 MIN	RHRG3070 TYP	RHRG3070 MAX	RHRG3080 MIN	RHRG3080 TYP	RHRG3080 MAX	RHRG3090 MIN	RHRG3090 TYP	RHRG3090 MAX	RHRG30100 MIN	RHRG30100 TYP	RHRG30100 MAX	UNITS
V_F	I_F = 30A, T_C = +25°C	-	-	3.0	-	-	3.0	-	-	3.0	-	-	3.0	V
	I_F = 30A, T_C = +150°C	-	-	2.5	-	-	2.5	-	-	2.5	-	-	2.5	V
I_R	V_R = 700V, T_C = +25°C	-	-	250	-	-	-	-	-	-	-	-	-	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	-	-	1.0	-	-	-	-	-	-	-	-	-	mA
	V_R = 800V, T_C = +150°C	-	-	-	-	-	1.0	-	-	-	-	-	-	mA
	V_R = 900V, T_C = +150°C							-	-	1.0				mA
	V_R = 1000V, T_C = +150°C	-	-	-	-	-	-	-	-	-	-	-	1.0	mA
t_{RR}	I_F = 1A, dI_F/dt = 100A/µs	-	-	65	-	-	65	-	-	65	-	-	65	ns
	I_F = 30A, dI_F/dt = 100A/µs	-	-	75	-	-	75	-	-	75	-	-	75	ns
t_A	I_F = 30A, dI_F/dt = 100A/µs	-	35	-	-	35	-	-	35	-	-	35	-	ns
t_B	I_F = 30A, dI_F/dt = 100A/µs	-	33	-	-	33	-	-	33	-	-	33	-	ns
Q_{RR}	I_F = 30A, dI_F/dt = 100A/µs	-	200	-	-	200	-	-	200	-	-	200	-	nC
C_J	V_R = 10V, I_F = 0A	-	100	-	-	100	-	-	100	-	-	100	-	pF
$R_{θJC}$		-	-	1.2	-	-	1.2			1.2	-	-	1.2	°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.

$R_{θJC}$ = Thermal resistance junction to case.

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

pw = pulse width.

D = duty cycle.

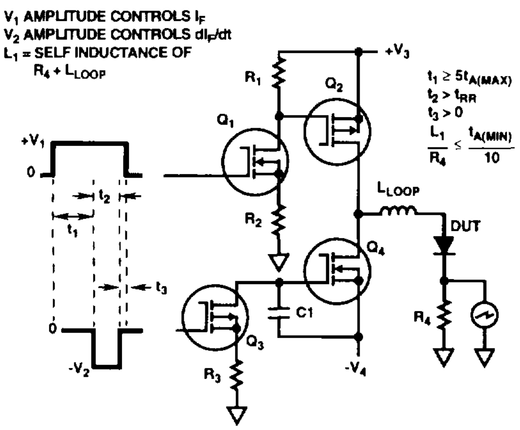


FIGURE 1. t_{RR} TEST CIRCUIT

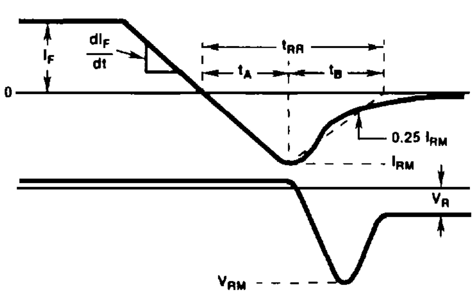


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

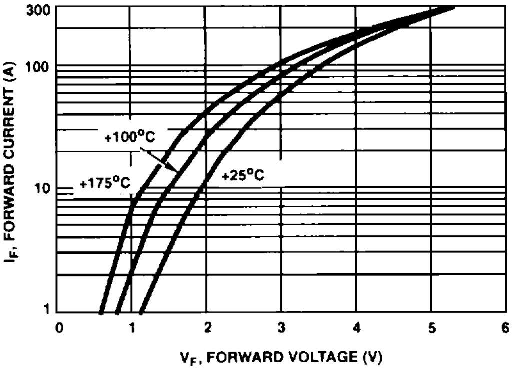


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

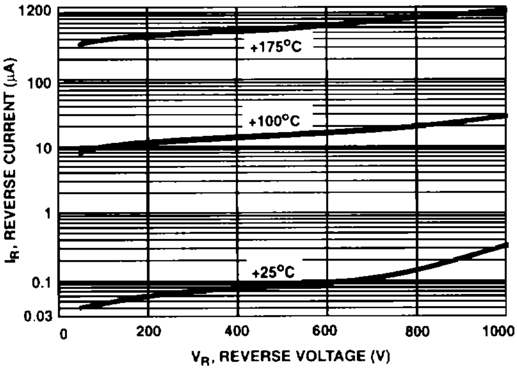


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

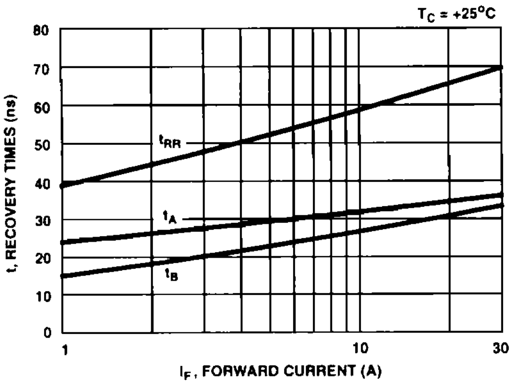


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +25°C

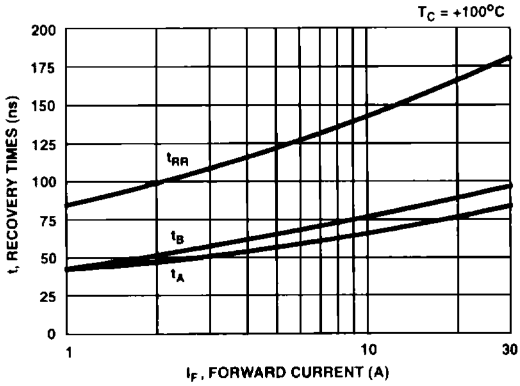


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +100°C

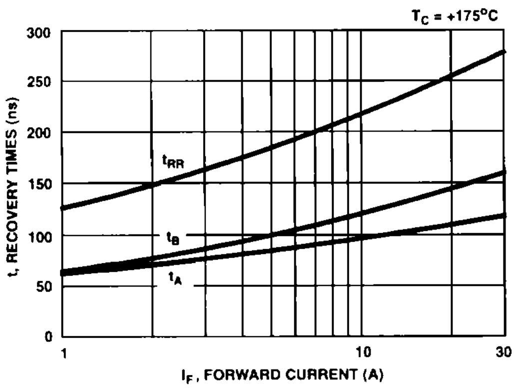


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +175°C

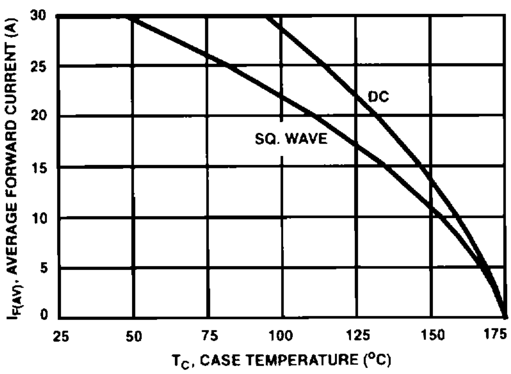


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

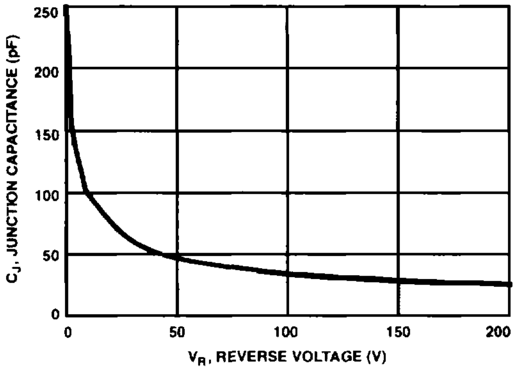


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuit and Waveforms

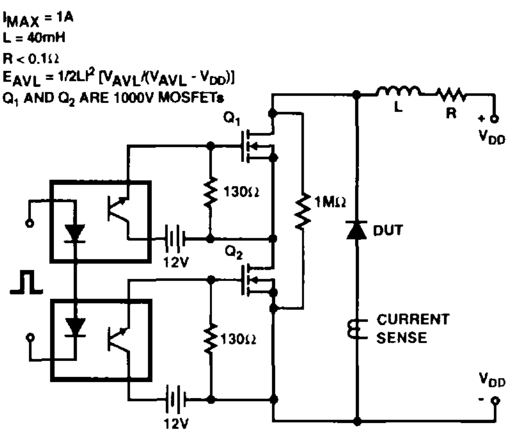


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

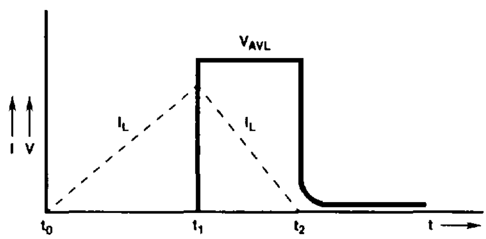


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS