HARRIS SEMICONDUCTOR

RHRG5070, RHRG5080, RHRG5090, RHRG50100

April 1995

50A, 700V - 1000V Hyperfast Diodes

Features

- **Hyperfast with Soft Recovery . . . . . <75ns**
- **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

RHRG5070, RHRG5080, RHRG5090 and RHRG50100 (TA49066) are hyperfast diodes with soft recovery characteristics (t_{RR} < 75ns). 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.

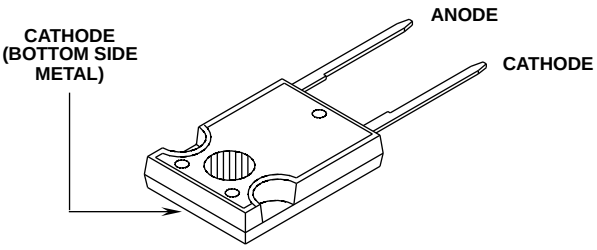
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RHRG5070	TO-247	RHRG5070
RHRG5080	TO-247	RHRG5080
RHRG5090	TO-247	RHRG5090
RHRG50100	TO-247	RHRG50100

NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE TO-247



Symbol

Absolute Maximum Ratings T_C = +25^{o}C

	RHRG5070	RHRG5080	RHRG5090	RHRG50100
Peak Repetitive Reverse Voltage . . . . . V_{RRM}	700V	800V	900V	1000V
Working Peak Reverse Voltage . . . . . V_{RWM}	700V	800V	900V	1000V
DC Blocking Voltage . . . . . V_R	700V	800V	900V	1000V
Average Rectified Forward Current . . . . . $I_{F(AV)}$ (T_C = +60^{o}C)	50A	50A	50A	50A
Repetitive Peak Surge Current . . . . . I_{FSM} (Square Wave, 20kHz)	100A	100A	100A	100A
Nonrepetitive Peak Surge Current . . . . . I_{FSM} (Halfwave, 1 Phase, 60Hz)	500A	500A	500A	500A
Maximum Power Dissipation . . . . . P_D	150W	150W	150W	150W
Avalanche Energy . . . . . E_{AVL} (L = 40mH)	40mj	40mj	40mj	40mj
Operating and Storage Temperature . . . . . T_{STG}, T_J	-65^{o}C to +175^{o}C	-65^{o}C to +175^{o}C	-65^{o}C to +175^{o}C	-65^{o}C to +175^{o}C

File Number **3106.2**

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

SYMBOL	TEST CONDITION		RHRG5070 LIMITS			RHRG5080 LIMITS			RHRG5090 LIMITS			RHRG50100 LIMITS			UNITS
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	I_F = 50A		-	-	3.0	-	-	3.0	-	-	3.0	-	-	3.0	V
V_F	I_F = 50A	$T_C = +150^oC$	-	-	2.5	-	-	2.5	-	-	2.5	-	-	2.5	V
I_R	V_R = 700V		-	-	500	-	-	-		-	-	-	-	-	µA
	V_R = 800V		-	-	-	-	-	500	-	-	-	-	-	-	µA
	V_R = 900V		-	-	-	-	-	-	-	-	500	-	-	-	µA
	V_R = 1000V		-	-	-	-	-	-	-	-	-	-	-	500	µA
I_R	V_R = 700V	$T_C = +150^oC$	-	-	3.0	-	-	-	-	-	-	-	-	-	mA
	V_R = 800V	$T_C = +150^oC$	-	-	-	-	-	3.0	-	-	-	-	-	-	mA
	V_R = 900V	$T_C = +150^oC$	-	-	-	-	-	-	-	-	3.0	-	-	-	mA
	V_R = 1000V	$T_C = +150^oC$	-	-	-	-	-	-	-	-	-	-	-	3.0	mA
t_{RR}	I_F = 1A, dI_F/dt = 100A/µs		-	-	75	-	-	75	-	-	75	-	-	75	ns
t_{RR}	I_F = 50A, dI_F/dt = 100A/µs		-	-	95	-	-	95	-	-	95	-	-	95	ns
t_A	I_F = 50A, dI_F/dt = 100A/µs		-	54	-	-	54	-	-	54	-	-	54	-	ns
t_B	I_F = 50A, dI_F/dt = 100A/µs		-	32	-	-	32	-	-	32	-	-	32	-	ns
$R_{\theta JC}$			-	-	1.0	-	-	1.0	-	-	1.0	-	-	1.0	$^oC/W$

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).

$R_{\theta JC}$ = Thermal resistance junction to case.

E_{AVL} = Controlled avalanche energy. (See Figures 7 and 8).

pw = pulse width.

D = duty cycle.

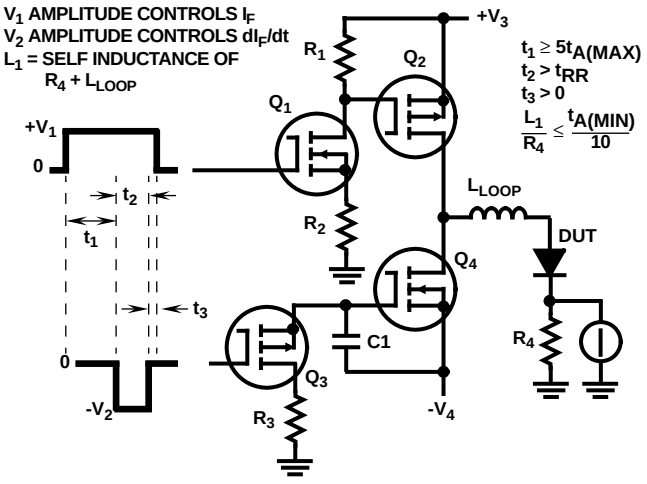


FIGURE 1. t_{RR} TEST CIRCUIT

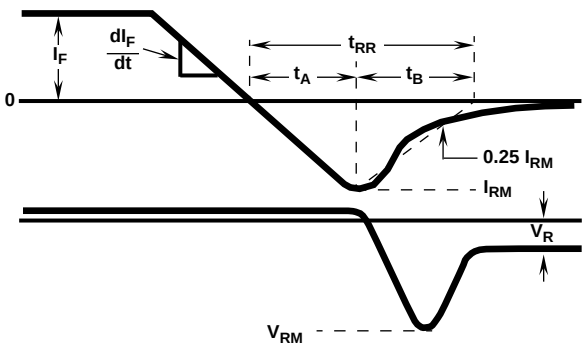


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

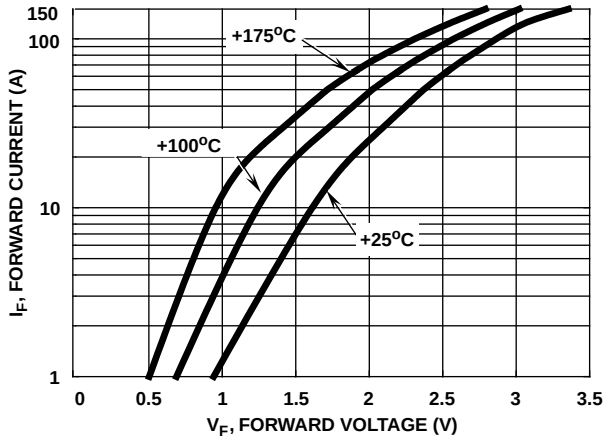


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

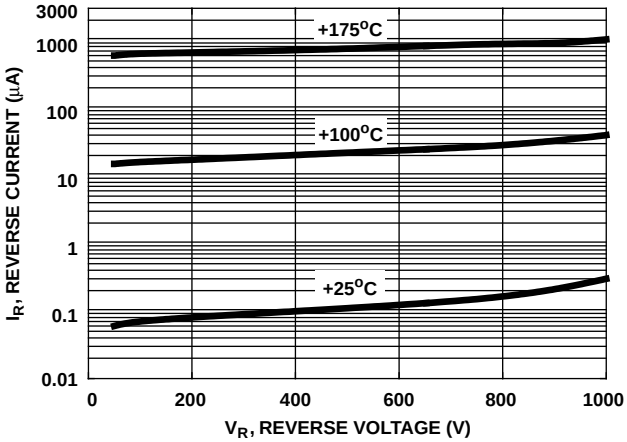


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

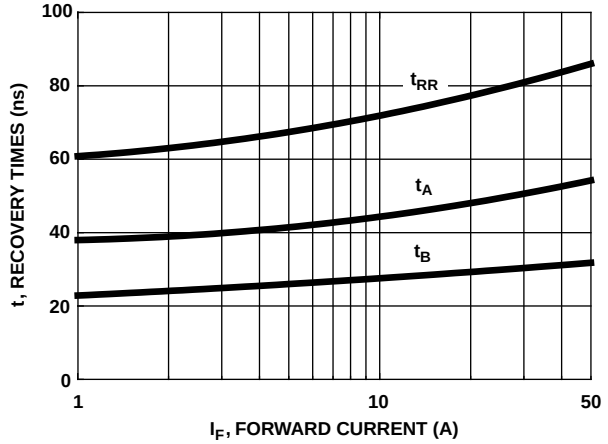


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT

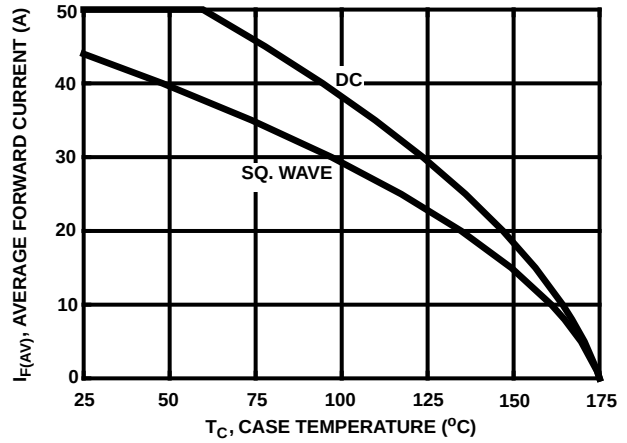


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

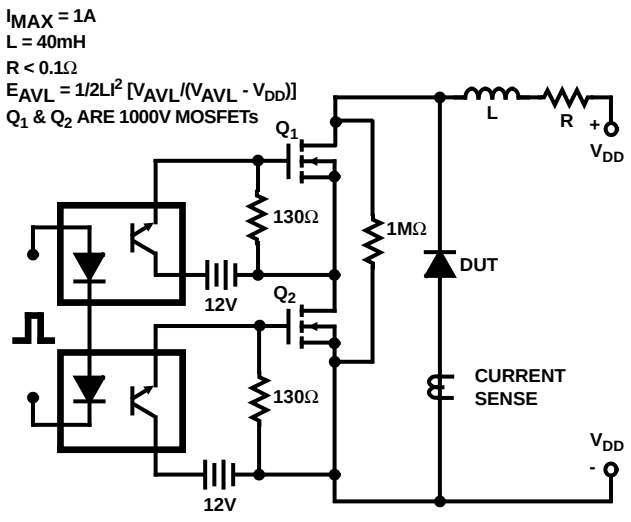


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

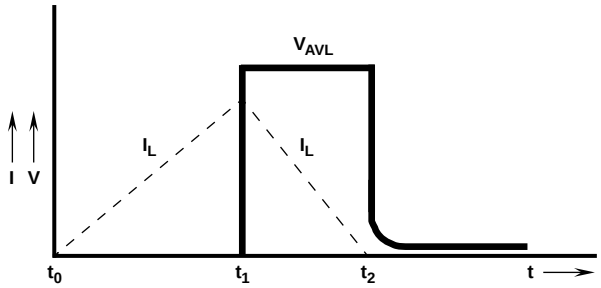


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS