HARRIS SEMICONDUCTOR

RHRG3040CC, RHRG3050CC, RHRG3060CC

April 1995

30A, 400V - 600V Hyperfast Dual Diodes

Features

- Hyperfast with Soft Recovery . . . . <40ns
- Operating Temperature . . . . +175°C
- Reverse Voltage Up To 600V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Description

RHRG3040CC, RHRG3050CC and RHRG3060CC are hyperfast diodes with soft recovery characteristics (t_{RR} < 40ns). 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

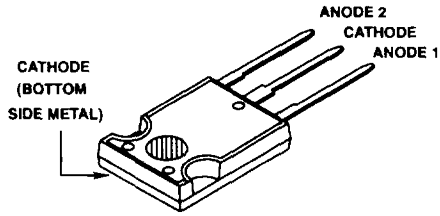
PART NUMBER	PACKAGE	BRAND
RHRG3040CC	TO-247	RHRG3040C
RHRG3050CC	TO-247	RHRG3050C
RHRG3060CC	TO-247	RHRG3060C

NOTE: When ordering, use the entire part number.

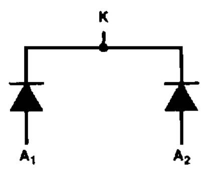
Formerly developmental type TA49063.

Package

JEDEC STYLE TO-247



Symbol



Absolute Maximum Ratings (per leg) T_C = +25°C, Unless Otherwise Specified

		RHRG3040CC	RHRG3050CC	RHRG3060CC	UNITS
Peak Repetitive Reverse Voltage	V_{RRM}	400	500	600	V
Working Peak Reverse Voltage	V_{RWM}	400	500	600	V
DC Blocking Voltage	V_R	400	500	600	V
Average Rectified Forward Current (T_C = +120°C)	$I_{F(AV)}$	30	30	30	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	70	70	70	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz)	I_{FSM}	325	325	325	A
Maximum Power Dissipation	P_D	125	125	125	W
Avalanche Energy (See Figures 10 and 11)	E_{AVL}	20	20	20	mj
Operating and Storage Temperature	T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	°C

Electrical Specifications (per leg) $T_C = +25^oC$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	RHRG3040CC			RHRG3050CC			RHRG3060CC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 30A$, $T_C = +25^oC$	-	-	2.1	-	-	2.1	-	-	2.1	V
	$I_F = 30A$, $T_C = +150^oC$	-	-	1.7	-	-	1.7	-	-	1.7	V
I_R	$V_R = 400V$, $T_C = +25^oC$	-	-	500	-	-	-	-	-	-	µA
	$V_R = 500V$, $T_C = +25^oC$	-	-	-	-	-	500	-	-	-	µA
	$V_R = 600V$, $T_C = +25^oC$	-	-	-	-	-	-	-	-	500	µA
I_R	$V_R = 400V$, $T_C = +150^oC$	-	-	1.0	-	-	-	-	-	-	mA
	$V_R = 500V$, $T_C = +150^oC$	-	-	-	-	-	1.0	-	-	-	mA
	$V_R = 600V$, $T_C = +150^oC$	-	-	-	-	-	-	-	-	1.0	mA
t_{RR}	$I_F = 1A$, $dI_F/dt = 200A/\mu s$	-	-	40	-	-	40	-	-	40	ns
	$I_F = 30A$, $dI_F/dt = 200A/\mu s$	-	-	45	-	-	45	-	-	45	ns
t_A	$I_F = 30A$, $dI_F/dt = 200A/\mu s$	-	22	-	-	22	-	-	22	-	ns
t_B	$I_F = 30A$, $dI_F/dt = 200A/\mu s$	-	18	-	-	18	-	-	18	-	ns
Q_{RR}	$I_F = 30A$, $dI_F/dt = 200A/\mu s$	-	100	-	-	100	-	-	100	-	nC
C_J	$V_R = 10V$, $I_F = 0A$	-	85	-	-	85	-	-	85	-	pF
$R_{\theta JC}$		-	-	1.2	-	-	1.2	-	-	1.2	$^oC/W$

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).

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.

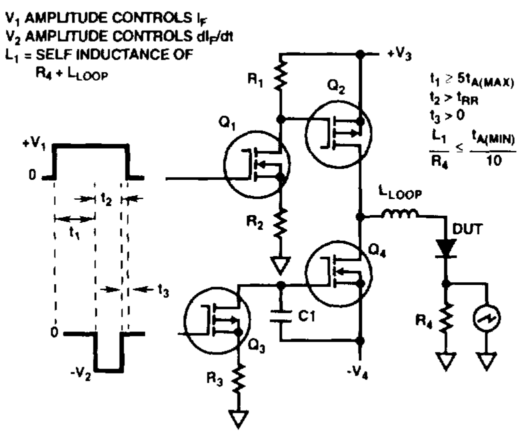


FIGURE 1. t_{RR} TEST CIRCUIT

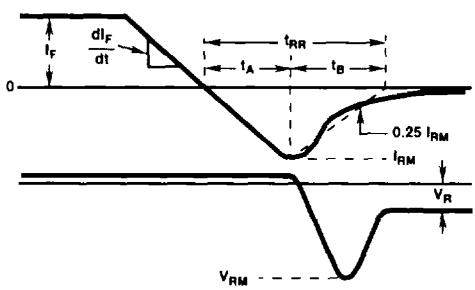


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

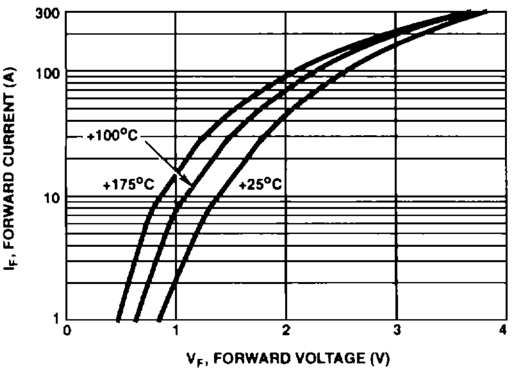


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

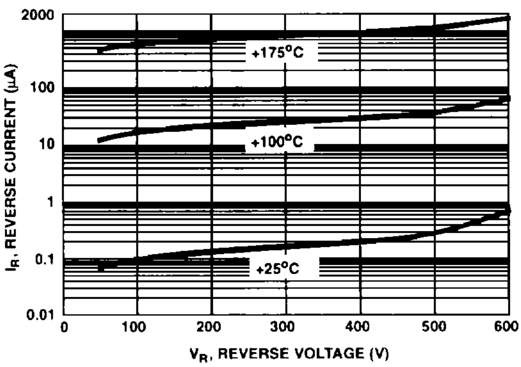


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

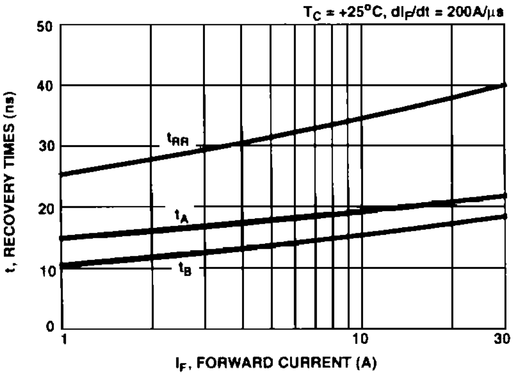


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +25°C

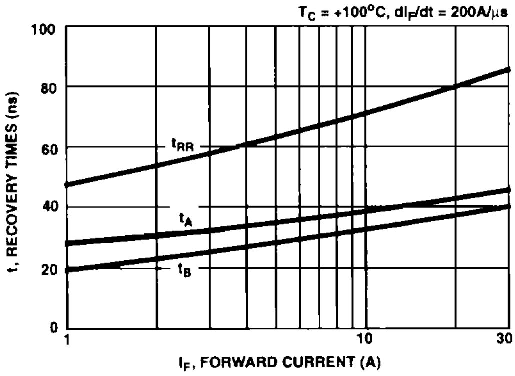


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +100°C

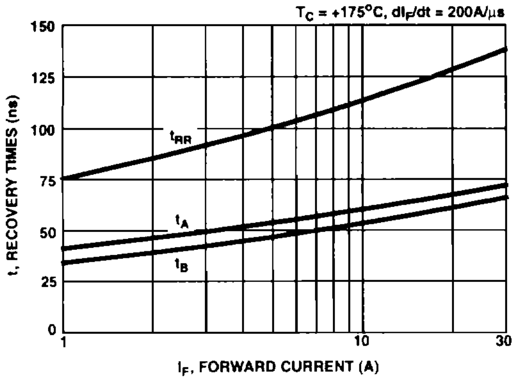


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +175°C

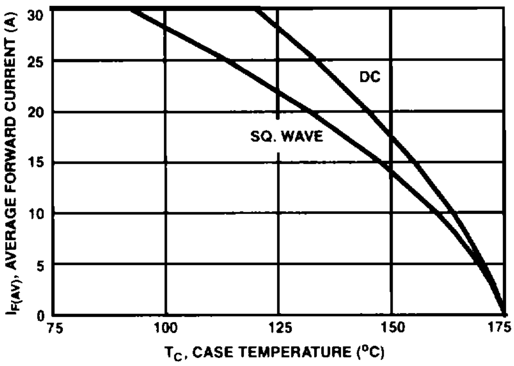


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

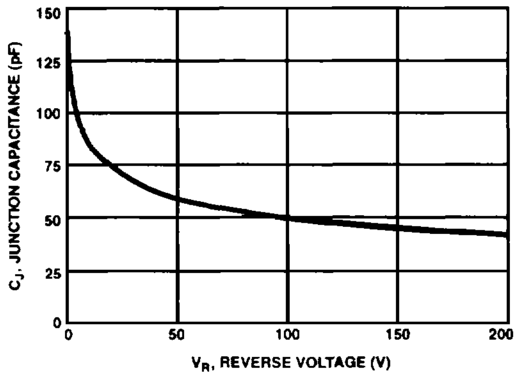


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

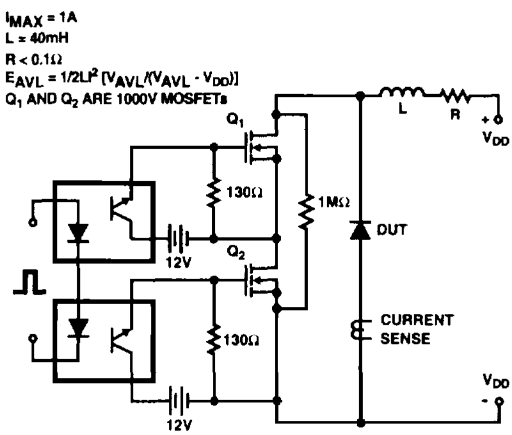


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

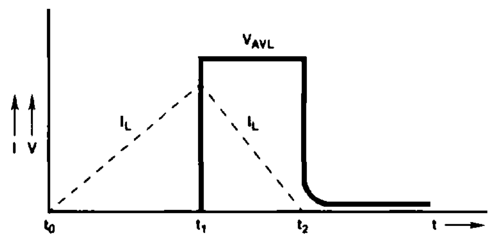


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS