RHRG1570CC, RHRG1580CC, RHRG1590CC, RHRG15100CC

April 1995

15A, 700V - 1000V Hyperfast Dual Diodes

Features

- **Hyperfast with Soft Recovery . . . . . < 60ns**
- **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

RHRG1570CC, RHRG1580CC, RHRG1590CC and RHRG15100CC (TA49062) are hyperfast dual diodes with soft recovery characteristics (t_{RR} < 60ns). 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.

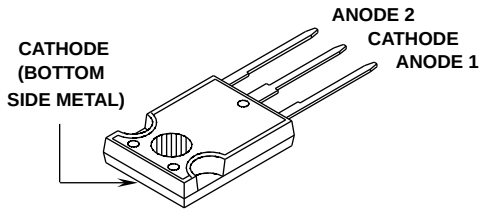
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RHRG1570CC	TO-247	RHRG1570C
RHRG1580CC	TO-247	RHRG1580C
RHRG1590CC	TO-247	RHRG1590C
RHRG15100CC	TO-247	RHR15100C

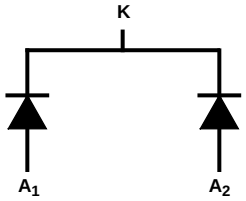
NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE TO-247



Symbol



Absolute Maximum Ratings (Per Leg) T_C = +25^{o}C, Unless Otherwise Specified

	RHRG1570CC	RHRG1580CC	RHRG1590CC	RHRG15100CC	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 = +130^{o}C)	15	15	15	15	A
Repetitive Peak Surge Current . . . . . I_{FSM} (Square Wave, 20kHz)	30	30	30	30	A
Nonrepetitive Peak Surge Current . . . . . I_{FSM} (Halfwave, 1 phase, 60Hz)	200	200	200	200	A
Maximum Power Dissipation . . . . . P_D	100	100	100	100	W
Avalanche Energy (L = 40mH) . . . . . 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	^{o}C

File Number **3693.1**

Electrical Specifications (Per Leg) $T_C = +25^oC$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	RHRG1570CC			RHRG1580CC			RHRG1590CC			RHRG15100CC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 15A, T_C = +25^oC$	-	-	3.0	-	-	3.0	-	-	3.0	-	-	3.0	V
	$I_F = 15A, T_C = +150^oC$	-	-	2.5	-	-	2.5	-	-	2.5	-	-	2.5	V
I_R	$V_R = 700V, T_C = +25^oC$	-	-	100	-	-	-	-	-	-	-	-	-	µA
	$V_R = 800V, T_C = +25^oC$	-	-	-	-	-	100	-	-	-	-	-	-	µA
	$V_R = 900V, T_C = +25^oC$	-	-	-	-	-	-	-	-	100	-	-	-	µA
	$V_R = 1000V, T_C = +25^oC$	-	-	-	-	-	-	-	-	-	-	-	100	µA
I_R	$V_R = 700V, T_C = +150^oC$	-	-	500	-	-	-	-	-	-	-	-	-	µA
	$V_R = 800V, T_C = +150^oC$	-	-	-	-	-	500	-	-	-	-	-	-	µA
	$V_R = 900V, T_C = +150^oC$	-	-	-	-	-	-	-	-	500	-	-	-	µA
	$V_R = 1000V, T_C = +150^oC$	-	-	-	-	-	-	-	-	-	-	-	500	µA
t_{RR}	$I_F = 1A, dI_F/dt = 100A/µs$	-	-	60	-	-	60	-	-	60	-	-	60	ns
	$I_F = 15A, dI_F/dt = 100A/µs$	-	-	70	-	-	70	-	-	70	-	-	70	ns
t_A	$I_F = 15A, dI_F/dt = 100A/µs$	-	40	-	-	40	-	-	40	-	-	40	-	ns
t_B	$I_F = 15A, dI_F/dt = 100A/µs$	-	25	-	-	25	-	-	25	-	-	25	-	ns
Q_{RR}	$I_F = 15A, dI_F/dt = 100A/µs$	-	160	-	-	160	-	-	160	-	-	160	-	nC
C_J	$V_R = 10V, I_F = 0A$	-	66	-	-	66	-	-	66	-	-	66	-	pF
$R_{\theta JC}$		-	-	1.5	-	-	1.5	-	-	1.5	-	-	1.5	$^oC/W$

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).

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

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

pw = pulse width.

D = duty cycle.

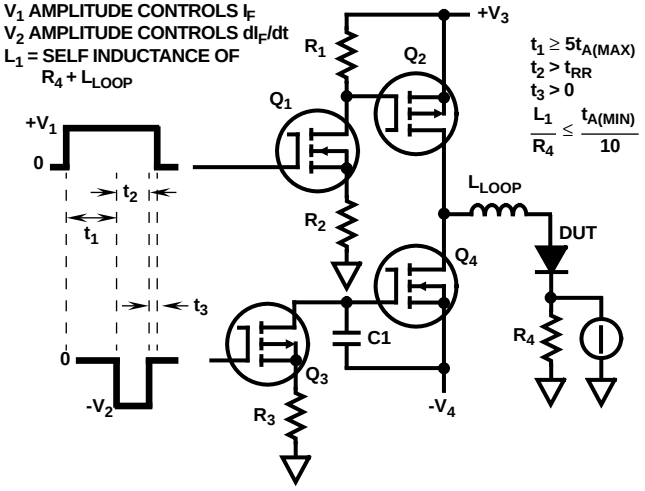


FIGURE 1. t_{RR} TEST CIRCUIT

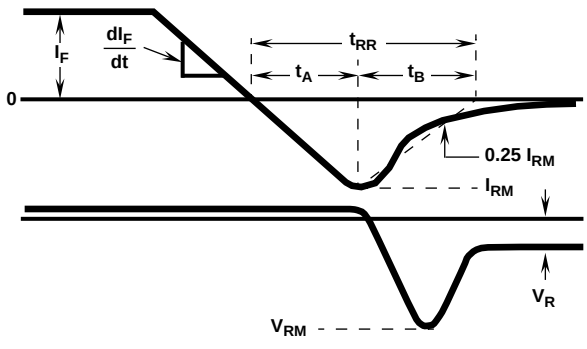


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

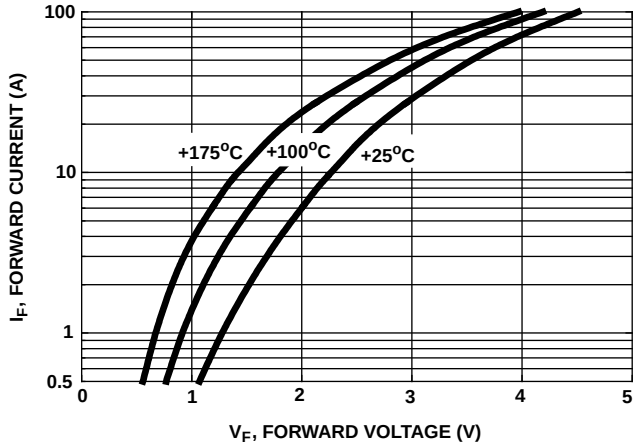


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

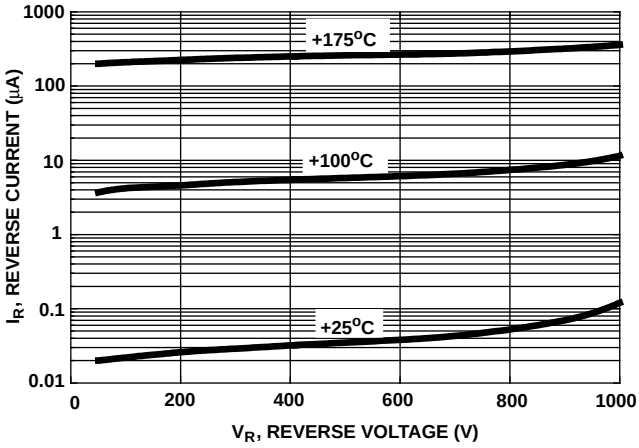


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

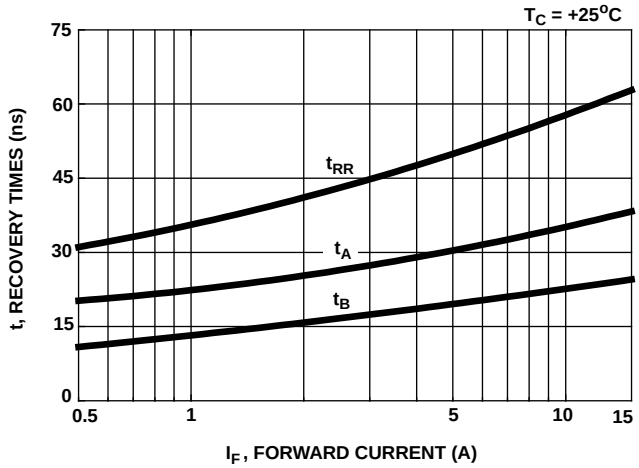


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 25°C

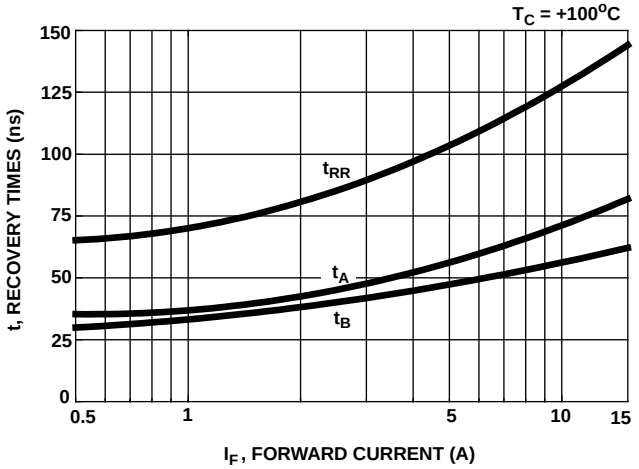


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 100°C

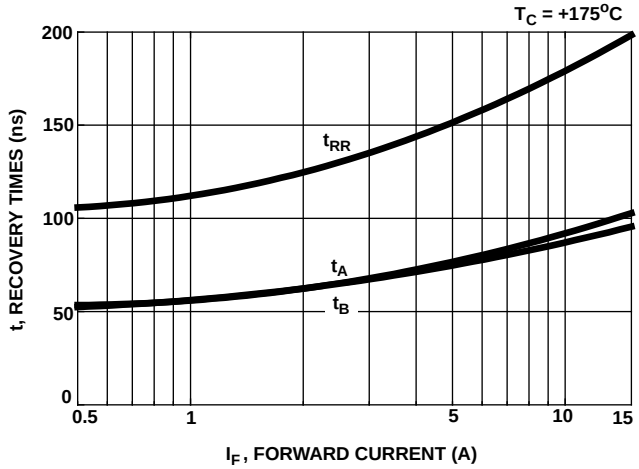


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 175°C

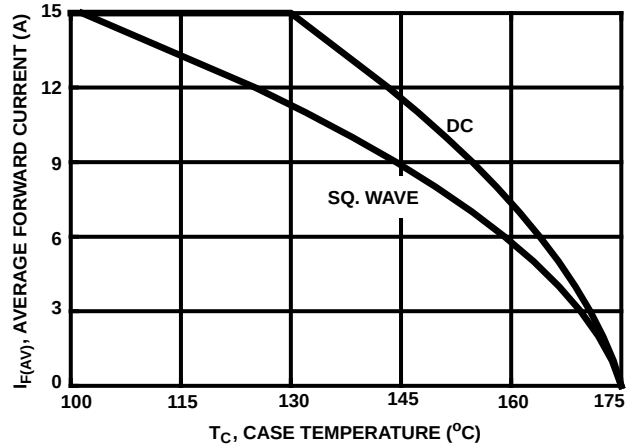


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

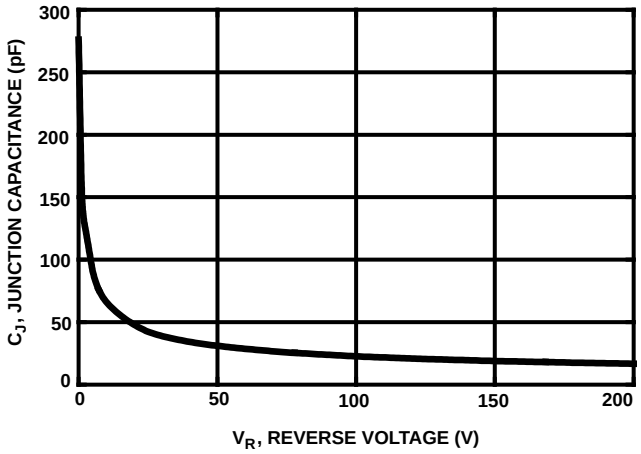


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

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

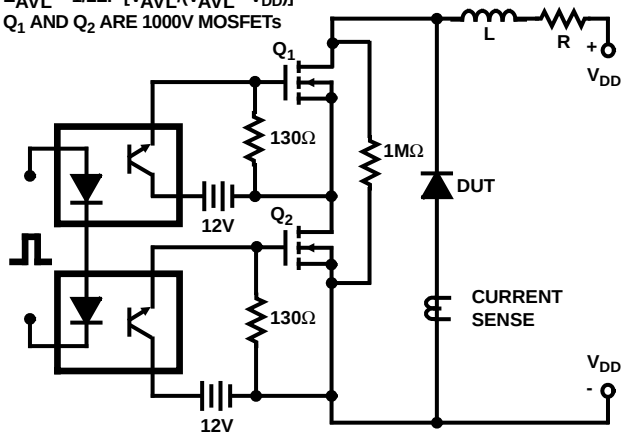


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

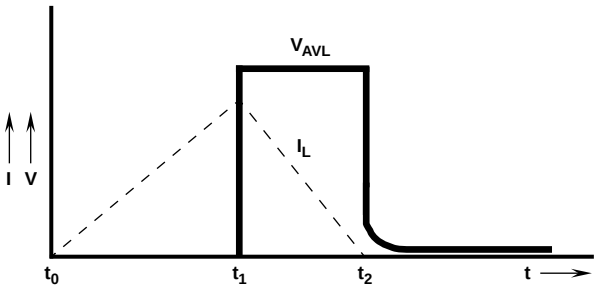


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS