RHRP870CC, RHRP880CC, RHRP890CC, RHRP8100CC

April 1995

8A, 700V - 1000V Hyperfast Dual Diodes

Features

- **Hyperfast with Soft Recovery . . . . . <55ns**
- **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

RHRP870CC, RHRP880CC, RHRP890CC and RHRP8100CC (TA49060) are hyperfast dual diodes with soft recovery characteristics (t_{RR} < 55ns). 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.

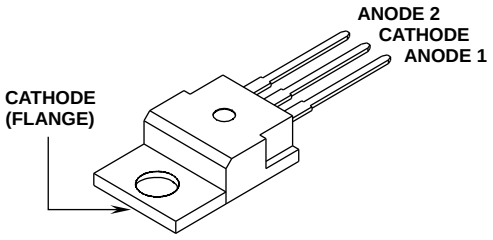
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RHRP870CC	TO-220AB	RHRP870C
RHRP880CC	TO-220AB	RHRP880C
RHRP890CC	TO-220AB	RHRP890C
RHRP8100CC	TO-220AB	RHR8100C

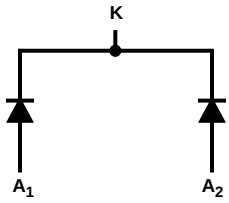
NOTE: When ordering, use the entire part number.

Package

JEDEC TO-220AB



Symbol



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

		RHRP870CC	RHRP880CC	RHRP890CC	RHRP8100CC	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 = +140^{o}C)	$I_{F(AV)}$	8	8	8	8	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	16	16	16	16	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz)	I_{FSM}	100	100	100	100	A
Maximum Power Dissipation	P_D	75	75	75	75	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	^{o}C

File Number **3965.1**

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

SYMBOL	TEST CONDITION	LIMITS												UNITS
		RHRP870CC			RHRP880CC			RHRP890CC			RHRP8100CC			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	I_F = 8A, T_C = +25°C	-	-	3.0	-	-	3.0	-	-	3.0	-	-	3.0	V
	I_F = 8A, T_C = +150°C	-	-	2.5	-	-	2.5	-	-	2.5	-	-	2.5	V
I_R	V_R = 700V, T_C = +25°C	-	-	100	-	-	-	-	-	-	-	-	-	µA
	V_R = 800V, T_C = +25°C	-	-	-	-	-	100	-	-	-	-	-	-	µA
	V_R = 900V, T_C = +25°C	-	-	-	-	-	-	-	-	100	-	-	-	µA
	V_R = 1000V, T_C = +25°C	-	-	-	-	-	-	-	-	-	-	-	100	µA
I_R	V_R = 700V, T_C = +150°C	-	-	500	-	-	-	-	-	-	-	-	-	µA
	V_R = 800V, T_C = +150°C	-	-	-	-	-	500	-	-	-	-	-	-	µA
	V_R = 900V, T_C = +150°C	-	-	-	-	-	--	-	-	500	-	-	-	µA
	V_R = 1000V, T_C = +150°C	-	-	-	-	-	-	-	-	-	-	-	500	µA
t_{RR}	I_F = 1A, dI_F/dt = 200A/µs	-	-	55	-	-	55	-	-	55	-	-	60	ns
	I_F = 8A, dI_F/dt = 200A/µs	-	-	65	-	-	65	-	-	65	-	-	65	ns
t_A	I_F = 8A, dI_F/dt = 200A/µs	-	30	-	-	30	-	-	30	-	-	30	-	ns
t_B	I_F = 8A, dI_F/dt = 200A/µs	-	20	-	-	20	-	-	20	-	-	20	-	ns
Q_{RR}	I_F = 8A, dI_F/dt = 200A/µs	-	175	-	-	175	-	-	175	-	-	175	-	nC
C_J	V_R = 10V, I_F = 0A	-	30	-	-	30	-	-	30	-	-	30	-	pF
$R_{\theta JC}$		-	-	2.0	-	-	2.0	-	-	2.0	-	-	2.0	°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.

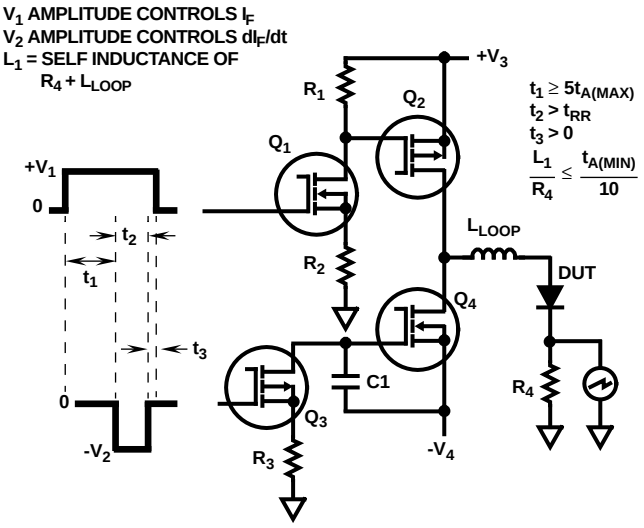


FIGURE 1. t_{RR} TEST CIRCUIT

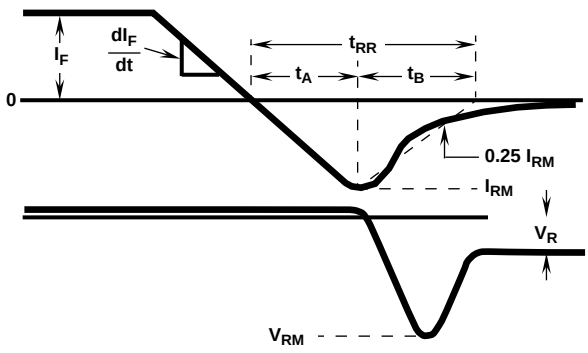


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

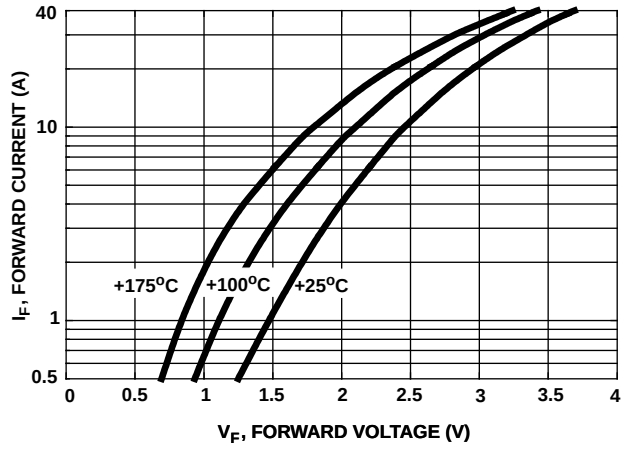


FIGURE 3. TYPICAL FORWARD CURRENT VS FORWARD VOLTAGE DROP

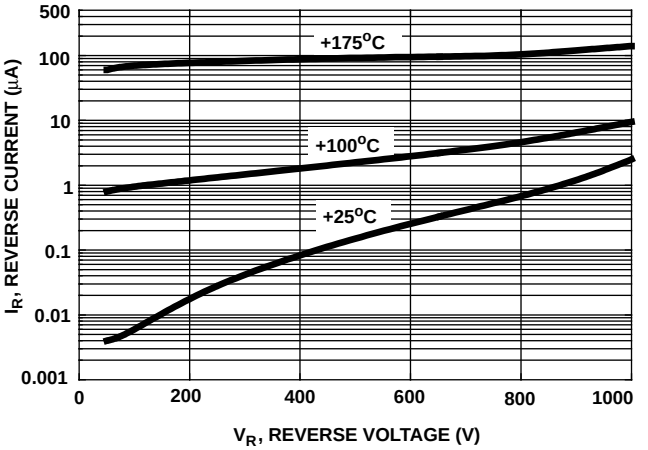


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

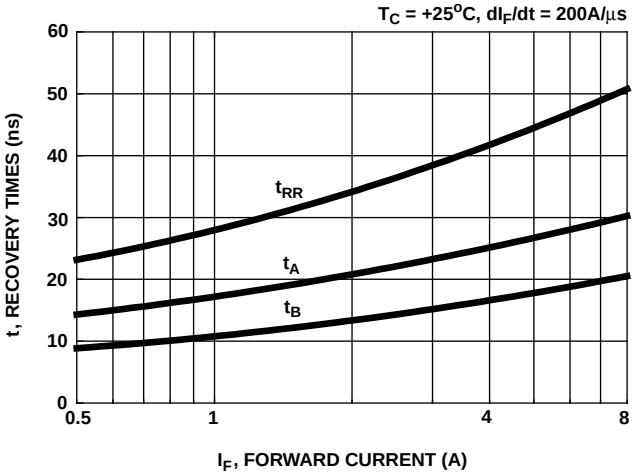


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 25°C

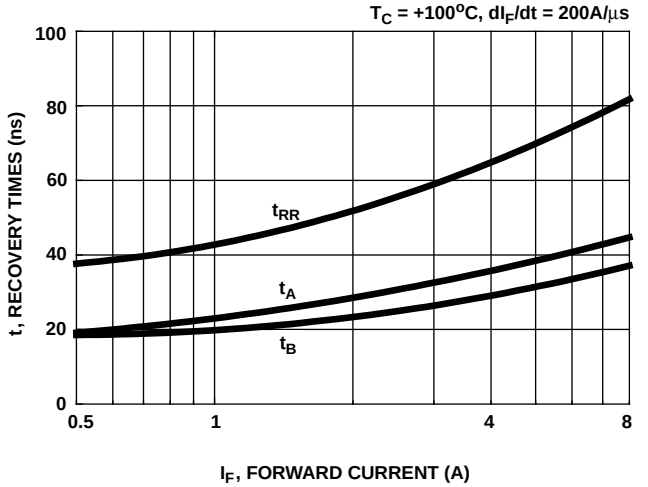


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 100°C

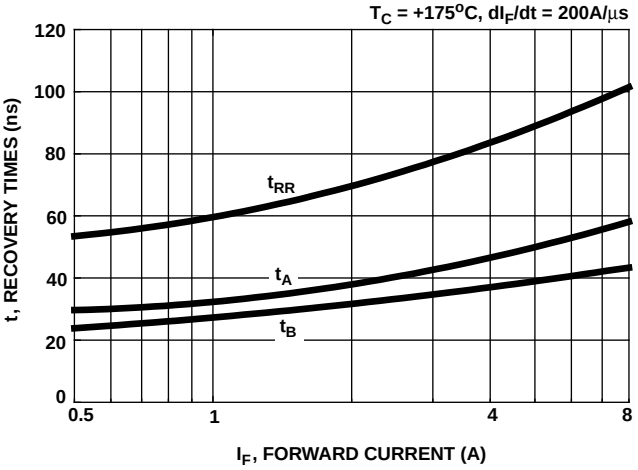


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 175°C

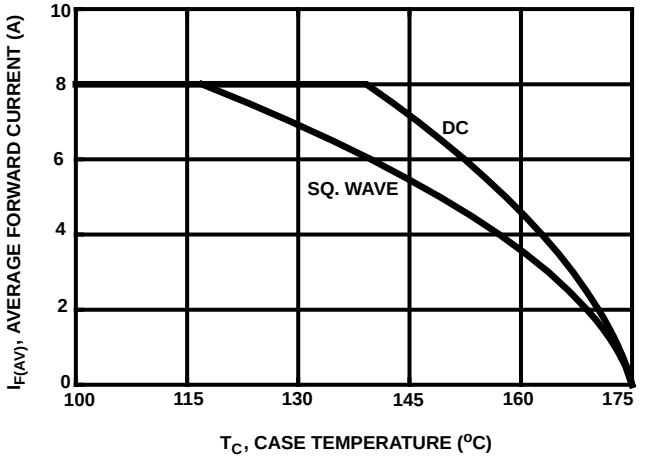


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

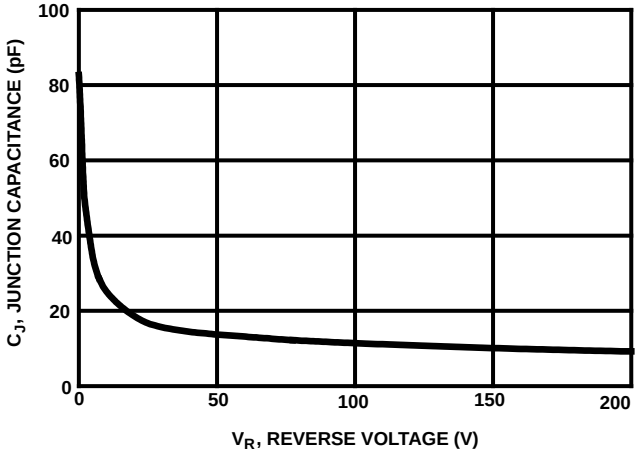


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

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

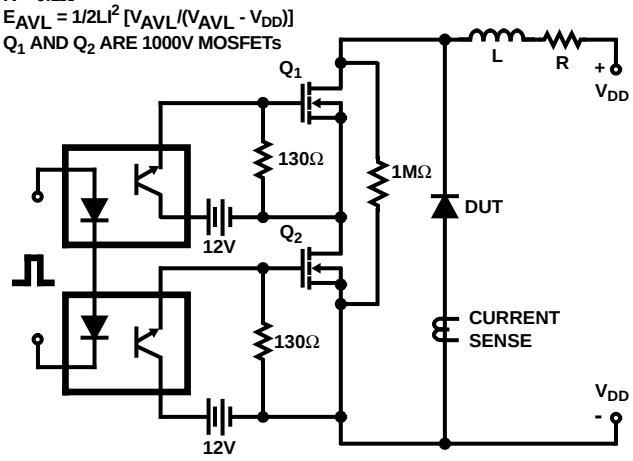


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

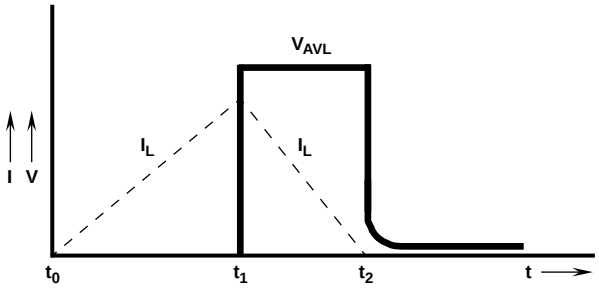


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS