July 1996 File Number 4091.1

6A, 1200V Hyperfast Dual Diode

The RHRP6120CC is a hyperfast dual diode with soft recovery characteristics (tRR < 55ns). It has half the recovery time of ultrafast diodes and is silicon nitride passivated ion-implanted epitaxial planar construction.

This device is intended for use as a freewheeling/clamping diode and rectifier in a variety of switching power supplies and other power switching applications. Its low stored charge and hyperfast soft recovery minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

Formerly developmental type TA49058.

PACKAGE AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RHRP6120CC	TO-220AB	RHR6120C

NOTE: When ordering, use the entire part number.

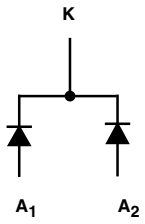
Features

- **Hyperfast with Soft Recovery . . . . . <55ns**
- **Operating Temperature . . . . . +175^{O}C**
- **Reverse Voltage 1200V**
- **Avalanche Energy Rated**
- **Planar Construction**

Applications

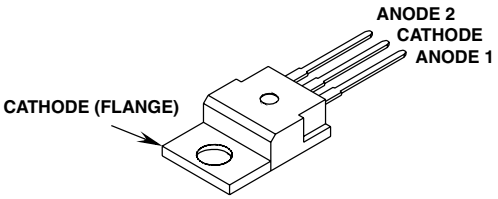
- **Switching Power Supplies**
- **Power Switching Circuits**
- **General Purpose**

Symbol



Packaging

JEDEC TO-220AB



Absolute Maximum Ratings (Per Leg) T_C = +25°C, Unless Otherwise Specified

		RHRP6120CC	UNITS
Peak Repetitive Reverse Voltage	V_{RRM}	1200	V
Working Peak Reverse Voltage	V_{RWM}	1200	V
DC Blocking Voltage	V_R	1200	V
Average Rectified Forward Current T_C = 130°C	$I_{F(AV)}$	6	A
Repetitive Peak Surge Current Square Wave, 20kHz	I_{FSM}	12	A
Nonrepetitive Peak Surge Current Halfwave, 1 Phase, 60Hz	I_{FSM}	60	A
Maximum Power Dissipation	P_D	50	W
Avalanche Energy (See Figures 10 and 11)	E_{AVL}	10	mJ
Operating and Storage Temperature	T_{STG},T_J	-65 to +175	°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Specifications (Per Leg) T_C = +25°C, Unless Otherwise Specified

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
V_F	I_F = 6A, T_C = +25°C	-	-	3.2	V
	I_F = 6A, T_C = +150°C	-	-	2.6	V
I_R	V_R = 1200V, T_C = +25°C	-	-	100	μA
	V_R = 1200V, T_C = +150°C	-	-	500	μA
t_{RR}	I_F = 1A, dI_F/dt = 200A/μs	-	-	55	ns
	I_F = 6A, dI_F/dt = 200A/μs	-	-	65	ns
t_A	I_F = 6A, dI_F/dt = 200A/μs	-	33	-	ns
t_B	I_F = 6A, dI_F/dt = 200A/μs	-	22	-	ns
Q_{RR}	I_F = 6A, dI_F/dt = 200A/μs	-	210	-	nC
C_J	V_R = 10V, I_F = 0A	-	22	-	pF
$R_{\theta JC}$		-	-	3	°C/W

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300μs, D = 2%).

I_R = Instantaneous reverse current.

t_{RR} = Reverse recovery time (See Figure 9), summation of t_A + t_B.

t_A = Time to reach peak reverse current (See Figure 9).

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 9).

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.

Typical Performance Curves

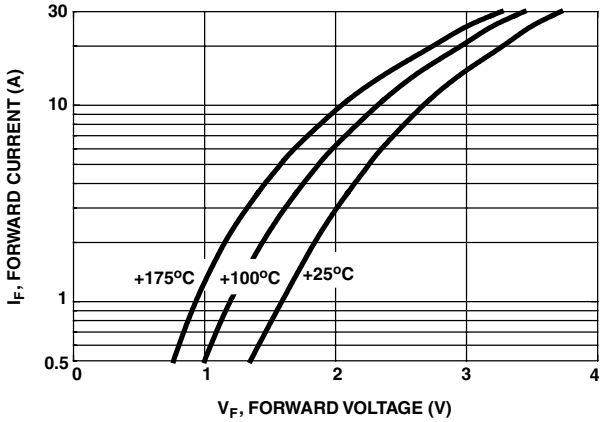


FIGURE 1. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

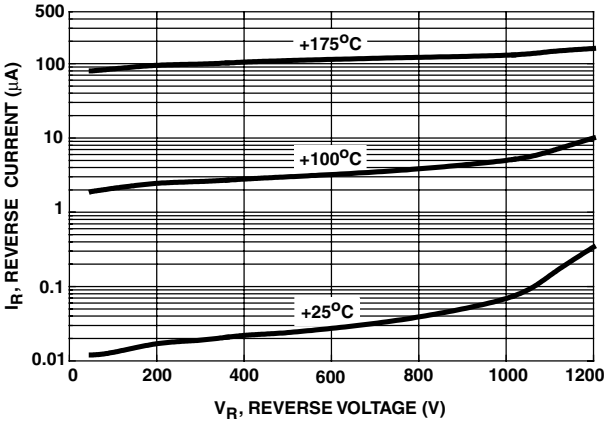


FIGURE 2. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

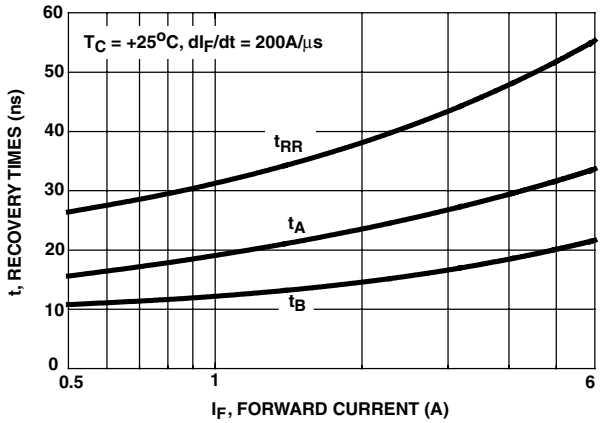


FIGURE 3. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 25°C

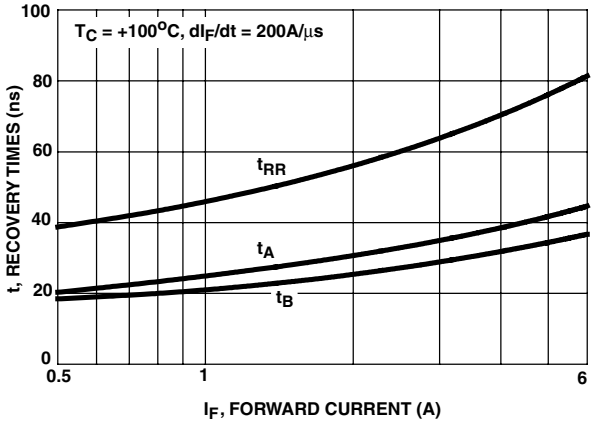


FIGURE 4. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 100°C

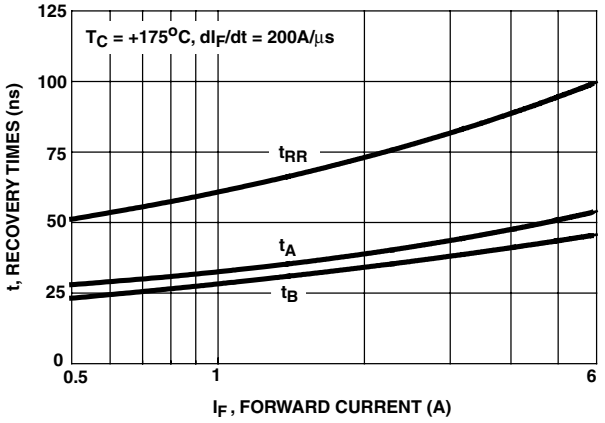


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 175°C

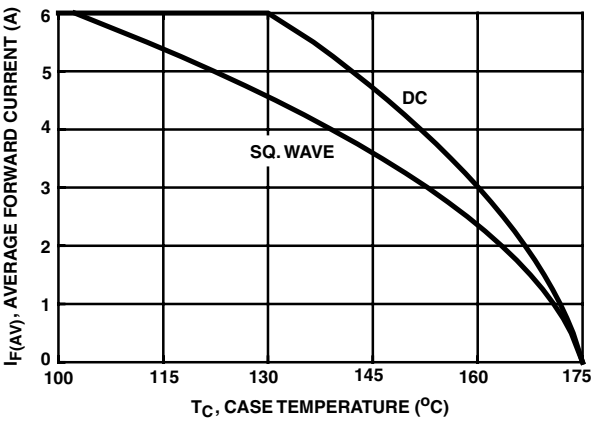


FIGURE 6. CURRENT DERATING CURVE

Typical Performance Curves (Continued)

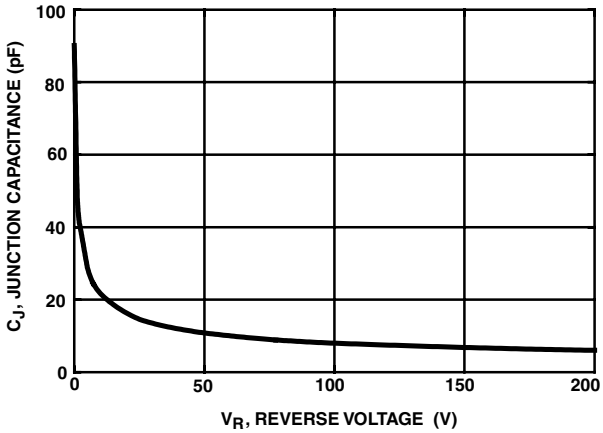


FIGURE 7. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

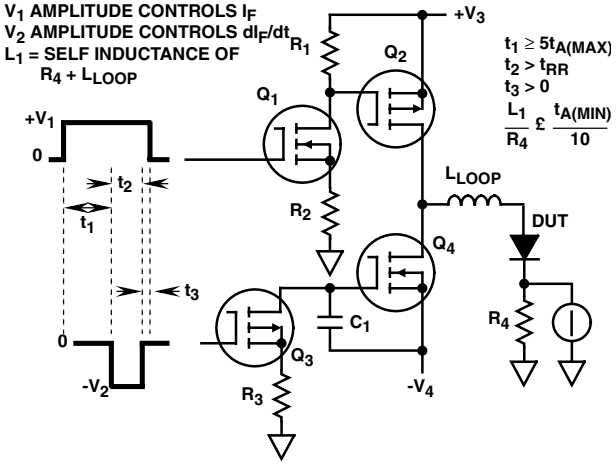


FIGURE 8. t_{RR} TEST CIRCUIT

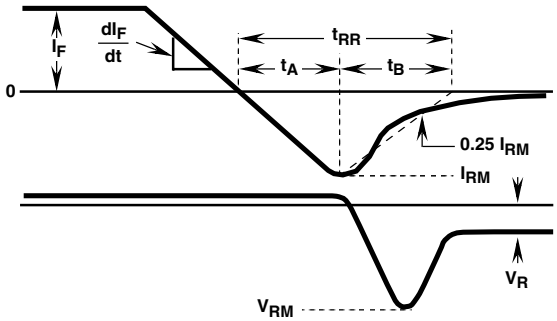


FIGURE 9. t_{RR} WAVEFORMS AND DEFINITIONS

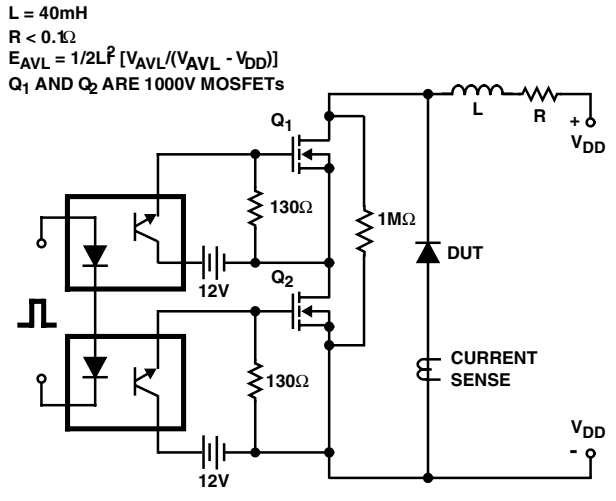


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

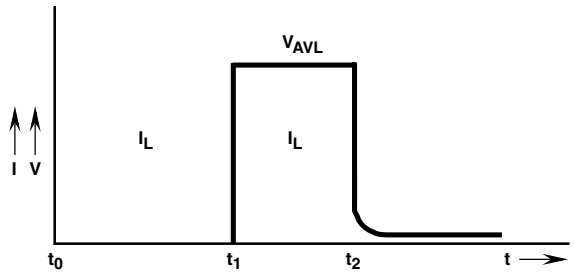
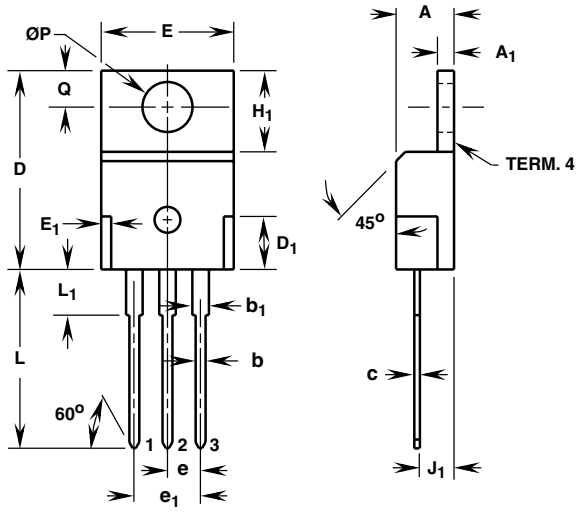


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

TO-220AB

3 LEAD JEDEC TO-220AB PLASTIC PACKAGE



LEAD 1. ANODE 1
LEAD 2. CATHODE
LEAD 3. ANODE 2
TERM. 4. CATHODE

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.170	0.180	4.32	4.57	-
A_1	0.048	0.052	1.22	1.32	-
b	0.030	0.034	0.77	0.86	3, 4
b_1	0.045	0.055	1.15	1.39	2, 3
c	0.014	0.019	0.36	0.48	2, 3, 4
D	0.590	0.610	14.99	15.49	-
D_1	-	0.160	-	4.06	-
E	0.395	0.410	10.04	10.41	-
E_1	-	0.030	-	0.76	-
e	0.100 TYP		2.54 TYP		5
e_1	0.200 BSC		5.08 BSC		5
H_1	0.235	0.255	5.97	6.47	-
J_1	0.100	0.110	2.54	2.79	6
L	0.530	0.550	13.47	13.97	-
L_1	0.130	0.150	3.31	3.81	2
ØP	0.149	0.153	3.79	3.88	-
Q	0.102	0.112	2.60	2.84	-

NOTES:

1. These dimensions are within allowable dimensions of Rev. J of JEDEC TO-220AB outline dated 3-24-87.
2. Lead dimension and finish uncontrolled in L_1.
3. Lead dimension (without solder).
4. Add typically 0.002 inches (0.05mm) for solder coating.
5. Position of lead to be measured 0.250 inches (6.35mm) from bottom of dimension D.
6. Position of lead to be measured 0.100 inches (2.54mm) from bottom of dimension D.
7. Controlling dimension: Inch.
8. Revision 1 dated 1-93.

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