Data Sheet | January 2000 | File Number 3942.2

## 30A, 1000V Hyperfast Dual Diode

The RHRG30100CC is a hyperfast dual diode with soft recovery characteristics ($t_{rr}$ < 65ns). It has half the recovery time of ultrafast diodes and is of 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, thus reducing power loss in the switching transistors.

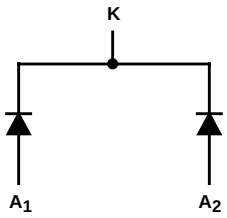
Formerly developmental type TA49064.

## Ordering Information

| PART NUMBER | PACKAGE | BRAND |
|---|---|---|
| RHRG30100CC | TO-247 | RHR30100C |

NOTE: When ordering, use the entire part number.

## Symbol




## Features

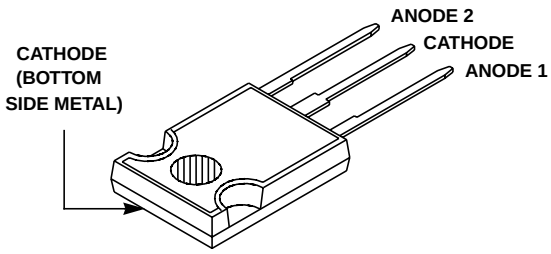
- Hyperfast with Soft Recovery . . . . . <65ns
- Operating Temperature. . . . . 175$^{o}$C
- Reverse Voltage . . . . . 1000V
- Avalanche Energy Rated
- Planar Construction

## Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

## Packaging

JEDEC STYLE TO-247




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

| | | RHRG30100CC | UNITS |
|---|---|---|---|
| Peak Repetitive Reverse Voltage | $V_{RRM}$ | 1000 | V |
| Working Peak Reverse Voltage | $V_{RWM}$ | 1000 | V |
| DC Blocking Voltage | $V_R$ | 1000 | V |
| Average Rectified Forward Current ($T_C$ = 95$^{o}$C) | $I_{F(AV)}$ | 30 | A |
| Repetitive Peak Surge Current (Square Wave, 20kHz) | $I_{FRM}$ | 70 | A |
| Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz) | $I_{FSM}$ | 325 | A |
| Maximum Power Dissipation | $P_D$ | 125 | W |
| Avalanche Energy (see Figures 10 and 11) | $E_{AVL}$ | 20 | mJ |
| Operating and Storage Temperature | $T_{STG}$, $T_J$ | -65 to 175 | $^{o}$C |



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

| SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|
| $V_F$ | $I_F$ = 30A | - | - | 3.0 | V |
| | $I_F$ = 30A, $T_C = 150^oC$ | - | - | 2.5 | V |
| $I_R$ | $V_R$ = 1000V | - | - | 250 | µA |
| | $V_R$ = 1000V, $T_C = 150^oC$ | - | - | 1.0 | mA |
| $t_{rr}$ | $I_F$ = 1A, $dI_F/dt$ = 100A/µs | - | - | 65 | ns |
| | $I_F$ = 30A, $dI_F/dt$ = 100A/µs | - | - | 75 | ns |
| $t_a$ | $I_F$ = 30A, $dI_F/dt$ = 100A/µs | - | 35 | - | ns |
| $t_b$ | $I_F$ = 30A, $dI_F/dt$ = 100A/µs | - | 33 | - | ns |
| $Q_{RR}$ | $I_F$ = 30A, $dI_F/dt$ = 100A/µs | - | 200 | - | nC |
| $C_J$ | $V_R$ = 10V, $I_F$ = 0A | - | 100 | - | pF |
| $R_{\theta JC}$ | | - | - | 1.2 | $^oC/W$ |

DEFINITIONS

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

$I_R$ = Instantaneous reverse current.

$t_{rr}$ = Reverse recovery time (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.

pw = pulse width.

D = duty cycle.

## *Typical Performance Curves*

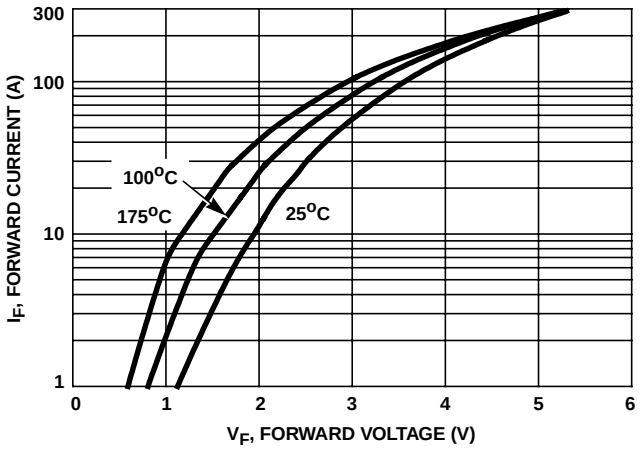



**FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE**

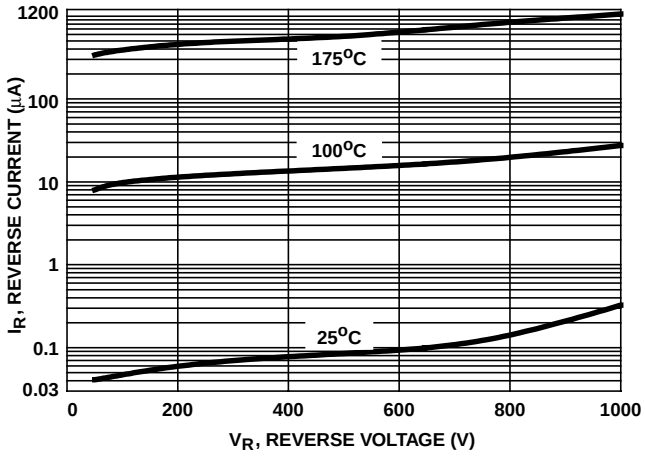



**FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE**

## Typical Performance Curves (Continued)

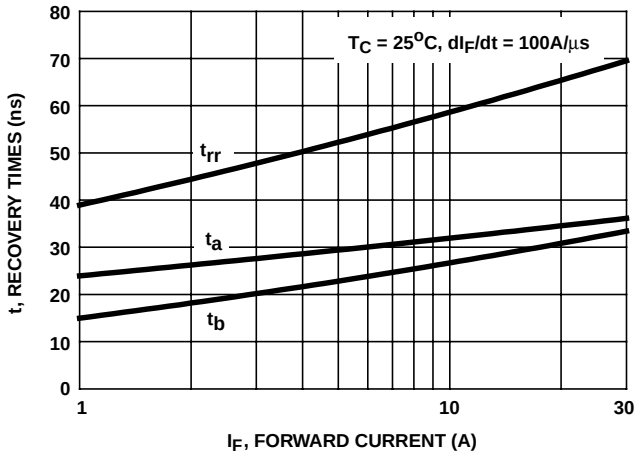



FIGURE 3. $t_{rr}$, $t_a$ AND $t_b$ CURVES vs FORWARD CURRENT

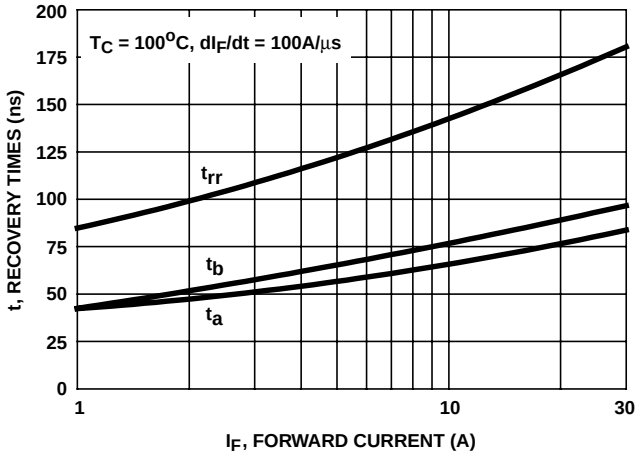



FIGURE 4. $t_{rr}$, $t_a$ AND $t_b$ CURVES vs FORWARD CURRENT

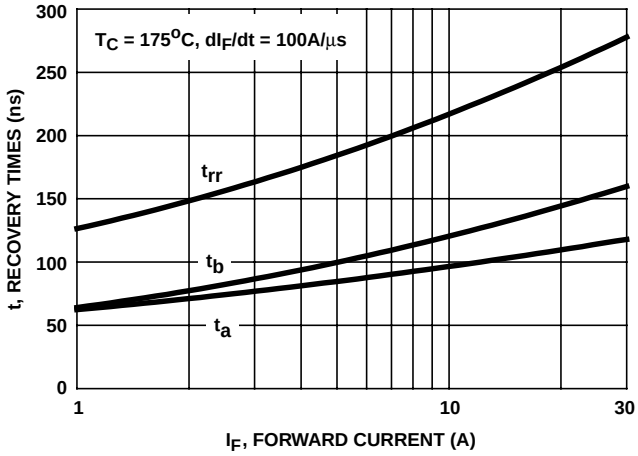



FIGURE 5. $t_{rr}$, $t_a$ AND $t_b$ CURVES vs FORWARD CURRENT

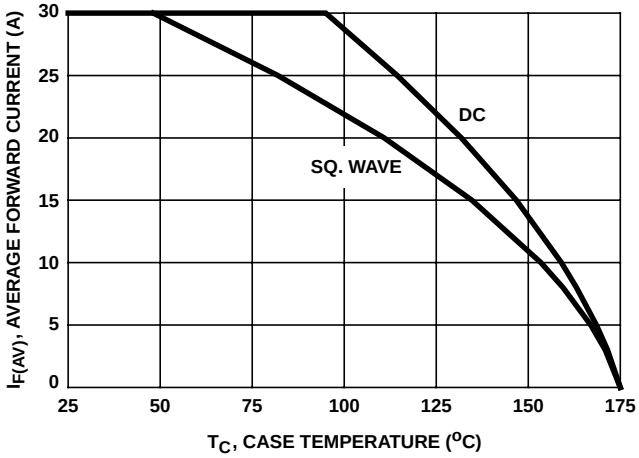



FIGURE 6. CURRENT DERATING CURVE

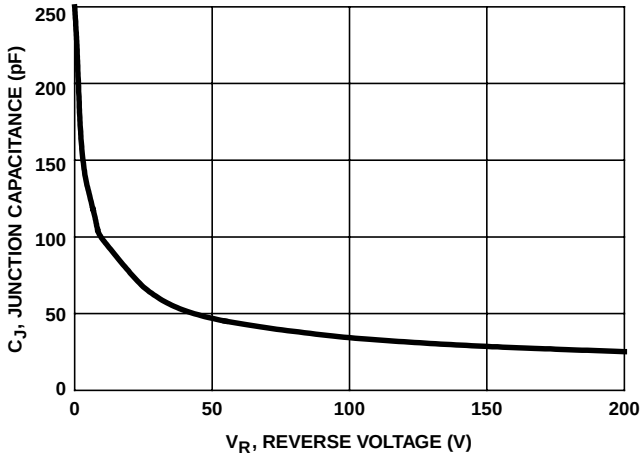



FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

## Test Circuits and Waveforms

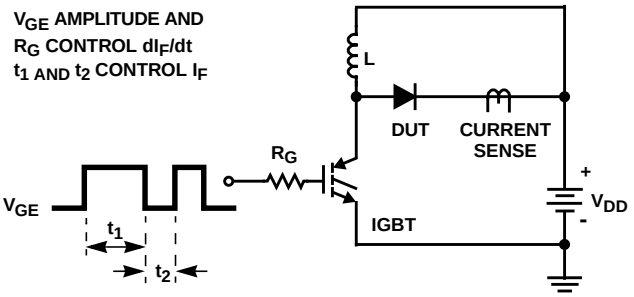



FIGURE 8. $t_{rr}$ TEST CIRCUIT

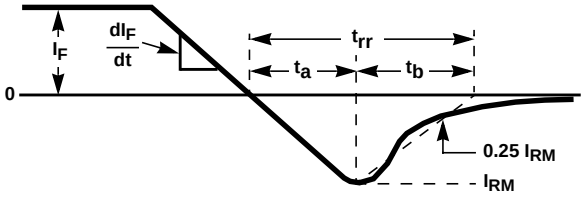



FIGURE 9. $t_{rr}$ WAVEFORMS AND DEFINITIONS

$I_{MAX}$ = 1A
L = 40mH
R < 0.1Ω
$E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$
$Q_1$ = IGBT ($BV_{CES}$ > DUT $V_{R(AVL)}$)

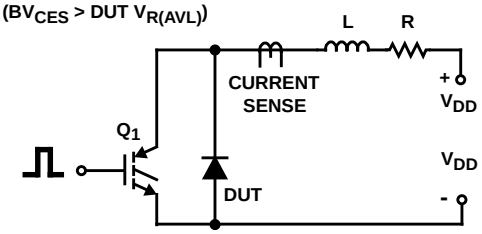



FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

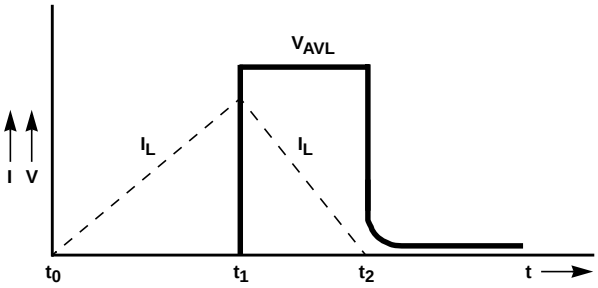



FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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