# 6 A, 600 V, Hyperfast Diode

The RHRD660S9A is a hyperfast diodes with soft recovery characteristics. It has the half recovery time of Ultrafast diodes and is silicon nitride passivated ionimplanted epitaxial planar construction. These devices are intended to be used as freewheeling/ clamping diodes and Diodes 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.

## Ordering Information

| PART NUMBER | PACKAGE | BRAND |
|---|---|---|
| RHRD660S | TO-252-3L | RHR660 |

## Symbol


## Features

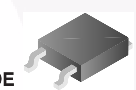
- Hyperfast Recovery $t_{rr}$ = 35 ns (@ $I_F$ = 6 A)
- Max Forward Voltage, $V_F$ = 2.6 V (@ $T_C$ = 25°C)
- 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS compliant

## Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

## Packaging

JEDEC STYLE TO-252




## Absolute Maximum Ratings $T_C = 25^oC$, Unless Otherwise Specified

| | | RATING | UNIT |
|---|---|---|---|
| Peak Repetitive Reverse Voltage | $V_{RRM}$ | 600 | V |
| Working Peak Reverse Voltage | $V_{RWM}$ | 600 | V |
| DC Blocking Voltage | $V_R$ | 600 | V |
| Average Rectified Forward Current ($T_C = 152^oC$) | $I_{F(AV)}$ | 6 | A |
| Repetitive Peak Surge Current (Square Wave, 20 kHz) | $I_{FRM}$ | 12 | A |
| Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60 Hz) | $I_{FSM}$ | 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 | $^oC$ |
| Maximum Lead Temperature for Soldering | | | |
| (Leads at 0.063 in. (1.6 mm) from case for 10 s) | $T_L$ | 300 | $^oC$ |
| Package Body for 10s, see Tech Brief 334 | $T_{PKG}$ | 260 | $^oC$ |

## Electrical Specifications

$T_C = 25^oC$, Unless Otherwise Specified

| SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $V_F$ | $I_F = 6$ A | - | - | 2.1 | V |
| | $I_F = 6$ A, $T_C = 150^oC$ | - | - | 1.7 | V |
| $I_R$ | $V_R = 600$ V | - | - | 100 | µA |
| | $V_R = 600$ V, $T_C = 150^oC$ | - | - | 500 | µA |
| $t_{rr}$ | $I_F = 1$ A, $dI_F/dt = 200$ A/µs | - | - | 30 | ns |
| | $I_F = 6$ A, $dI_F/dt = 200$ A/µs | - | - | 35 | ns |
| $t_a$ | $I_F = 6$ A, $dI_F/dt = 200$ A/µs | - | 16 | - | ns |
| $t_b$ | $I_F = 6$ A, $dI_F/dt = 200$ A/µs | - | 8.5 | - | ns |
| $Q_{rr}$ | $I_F = 6$ A, $dI_F/dt = 200$ A/µs | - | 45 | - | nC |
| $C_J$ | $V_R = 10$ V, $I_F = 0$ A | - | 20 | - | pF |
| $R_{\theta JC}$ | | - | - | 3 | $^oC/W$ |

DEFINITIONS

$V_F$ = Instantaneous forward voltage (pw = 300 µs, 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.

pw = Pulse width.

D = Duty cycle.

## *Typical Performance Curves*

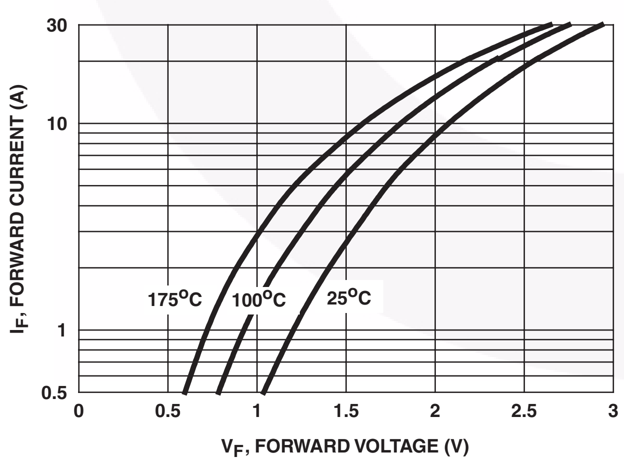



FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

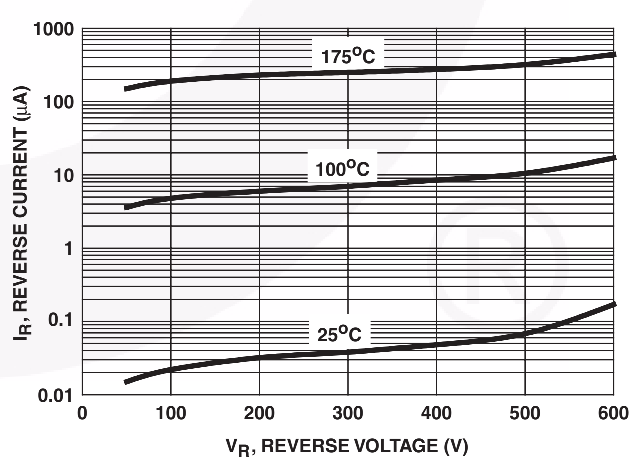



FIGURE 2. REVERSE CURRENT vs REVERSE

## Typical Performance Curves (Continued)

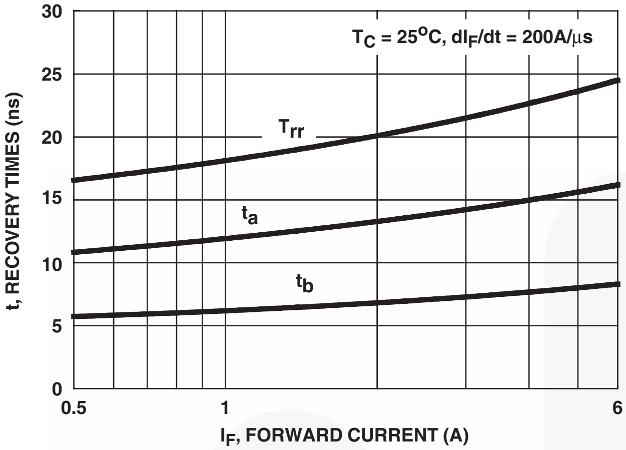



FIGURE 3. $T_{rr}$, $t_a$ AND $t_b$ CURVES vs FORWARD CURRENT

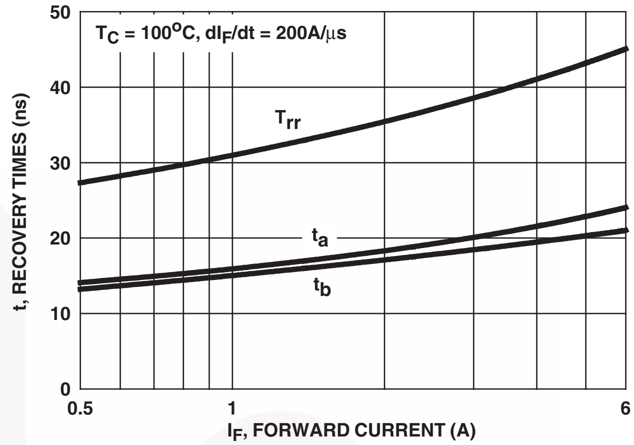



FIGURE 4. $T_{rr}$, $t_a$ AND $t_b$ CURVES vs FORWARD CURRENT

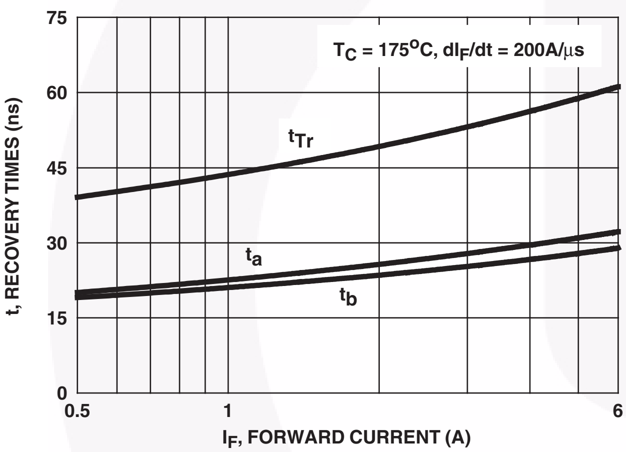



FIGURE 5. $T_{rr}$, $t_a$ AND $t_b$ CURVES vs FORWARD CURRENT

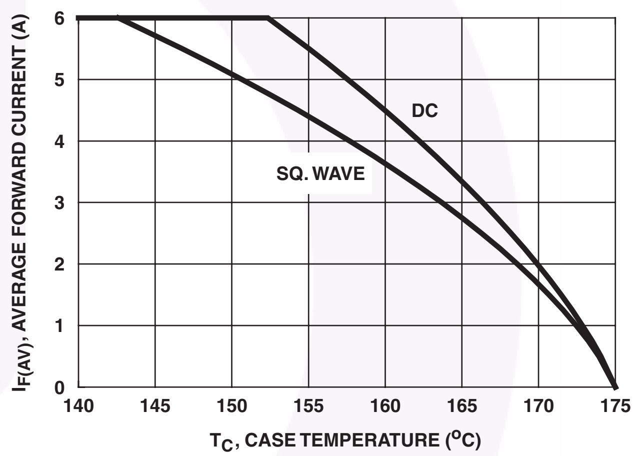



FIGURE 6. CURRENT DERATING CURVE

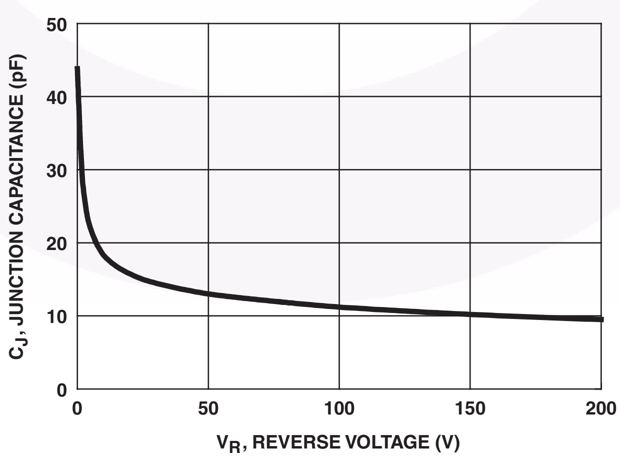



FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

## Test Circuits and Waveforms

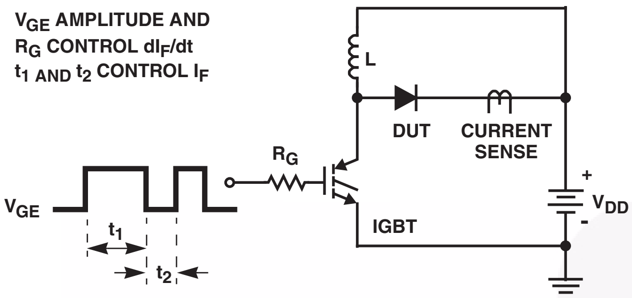



FIGURE 8. $T_{rr}$ TEST CIRCUIT

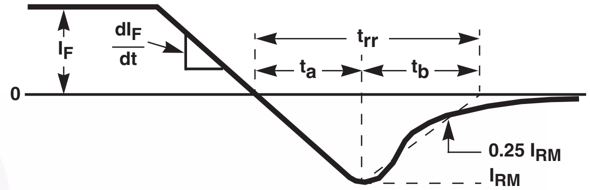



FIGURE 9. $T_{rr}$ WAVEFORMS AND DEFINITIONS

$I_{MAX}$ = 1A
L = 20mH
R < 0.1Ω
$E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$
$Q_1$ = IGBT ($BV_{CES}$ > DUT $V_{R(AVL)}$)

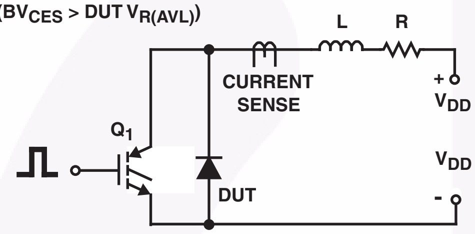



FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

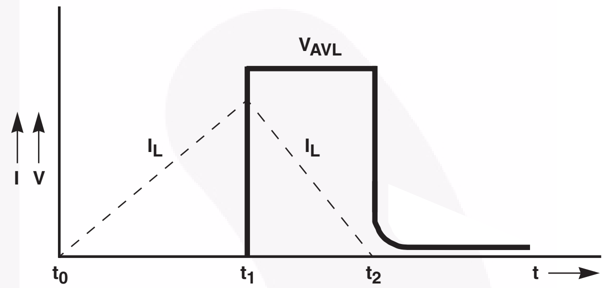



FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

## Mechanical Dimensions

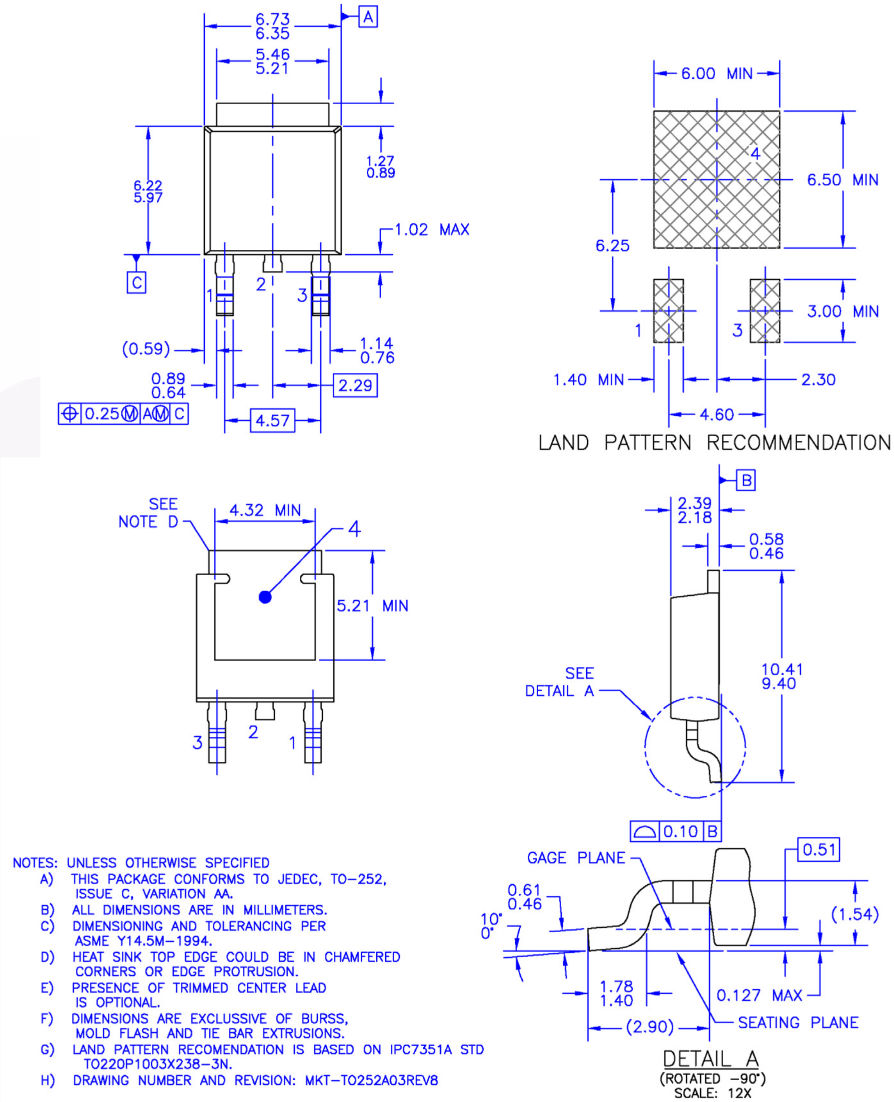



**Figure 12. TO-252 3L (DPAK) - TO252 (D-PAK), MOLDED, 3 LEAD,OPTION AA&AB**

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