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RHRP3060

30 A, 600 V Hyperfast Diodes

Features

- Hyperfast Recovery $t_{rr} = 45 \text{ ns}$ (@ $I_F = 30 \text{ A}$)
- Max Forward Voltage, $V_F = 2.1 \text{ V}$ (@ $T_C = 25^\circ\text{C}$)
- 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS Compliant

Description

The RHRP3060 is a hyperfast diode 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.

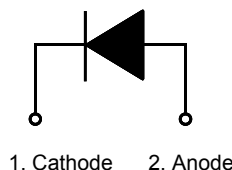
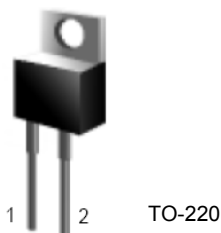
Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Ordering Informations

| Part Number | Package | Brand |
|-------------|-------------|----------|
| RHRP3060 | TO-220AC-2L | RHRP3060 |

Pin Assignments



Absolute Maximum Ratings

| Symbol | Parameter | RHRP3060 | Unit |
|----------------|---|------------|------------------|
| V_{RRM} | Peak Repetitive Reverse Voltage | 600 | V |
| V_{RWM} | Working Peak Reverse Voltage | 600 | V |
| V_R | DC Blocking Voltage | 600 | V |
| $I_{F(AV)}$ | Average Rectified Forward Current ($T_C = 120^\circ\text{C}$) | 30 | A |
| I_{FRM} | Repetitive Peak Surge Current (Square Wave, 20KHz) | 70 | A |
| I_{FSM} | Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz) | 325 | A |
| P_D | Maximum Power Dissipation | 125 | W |
| E_{AVL} | Avalanche Energy (See Figures 10 and 11) | 20 | mJ |
| T_J, T_{STG} | Operating and Storage Temperature | -65 to 175 | $^\circ\text{C}$ |

Electrical Characteristics T_C = 25°C unless otherwise noted

| Symbol | Test Conditions | RHRP3060 | | | Unit |
|------------------|---|----------|------|------|------|
| | | Min. | Typ. | Max. | |
| V _F | I _F = 30 A | - | - | 2.1 | V |
| | I _F = 30 A, T _C = 150°C | - | - | 1.7 | V |
| I _R | V _R = 400 V | - | - | - | μA |
| | V _R = 600 V | - | - | 250 | μA |
| | V _R = 400 V, T _C = 150°C | - | - | - | mA |
| | V _R = 600 V, T _C = 150°C | - | - | 1.0 | mA |
| t _{rr} | I _F = 1 A, dI _F /dt = 200 A/μs | - | - | 40 | ns |
| | I _F = 30 A, dI _F /dt = 200 A/μs | - | - | 45 | ns |
| t _a | I _F = 30 A, dI _F /dt = 200 A/μs | - | 22 | - | ns |
| t _b | I _F = 30 A, dI _F /dt = 200 A/μs | - | 18 | - | ns |
| Q _{RR} | I _F = 30 A, dI _F /dt = 200 A/μs | - | 100 | - | nC |
| C _J | V _R = 600 V, I _F = 0 A | - | 85 | - | pF |
| R _{θJC} | | - | - | 1.2 | °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_{θJC} = Thermal resistance junction to case.

pw = pulse width.

D = Duty cycle.

Typical Performance Characteristics

Figure 1. Forward Current vs Forward Voltage

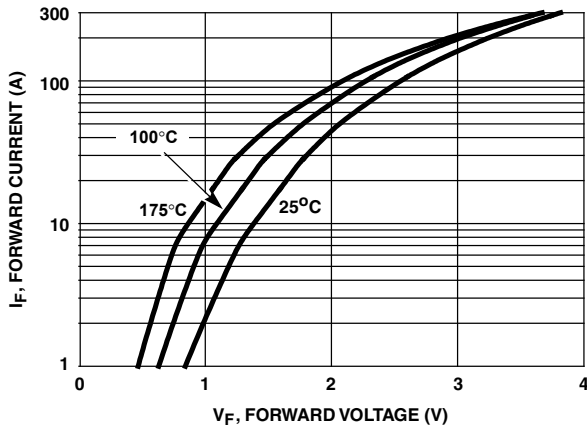


Figure 2. Reverse Current vs Reverse Voltage

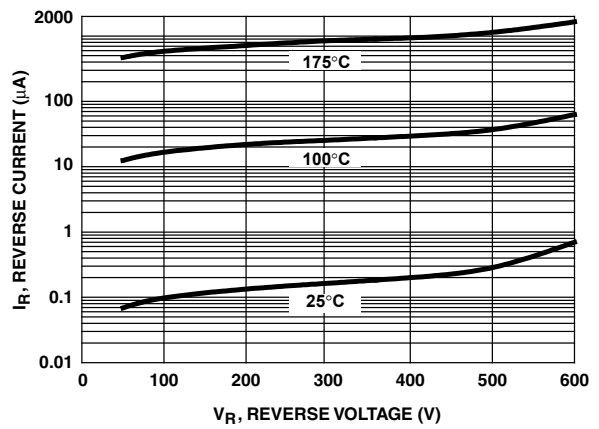


Figure 3. t_{rr} , t_a and t_b Curves vs Forward Current

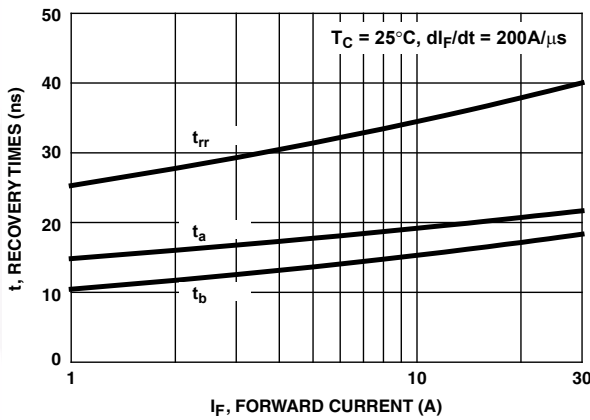


Figure 4. t_{rr} , t_a and t_b Curves vs Forward Current

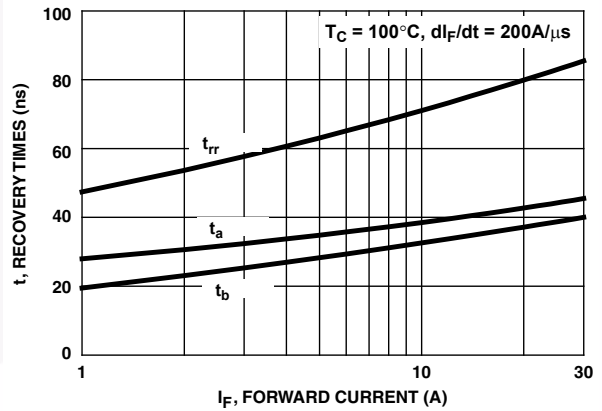


Figure 5. t_{rr} , t_a and t_b Curves vs Forward Current

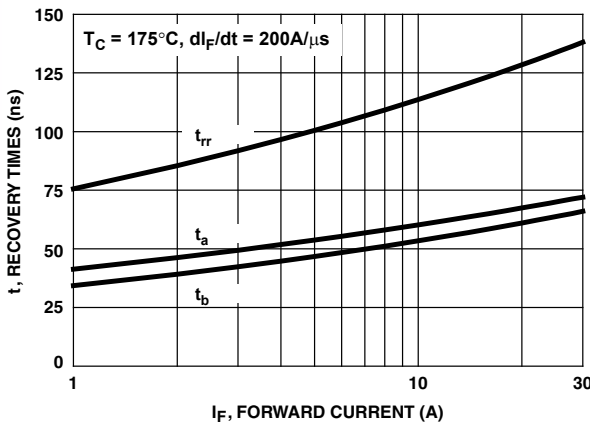
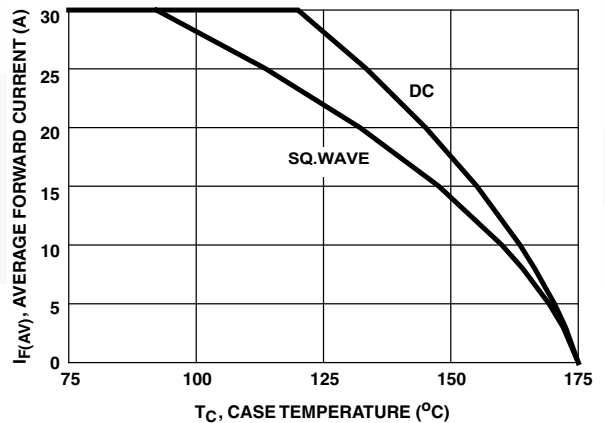
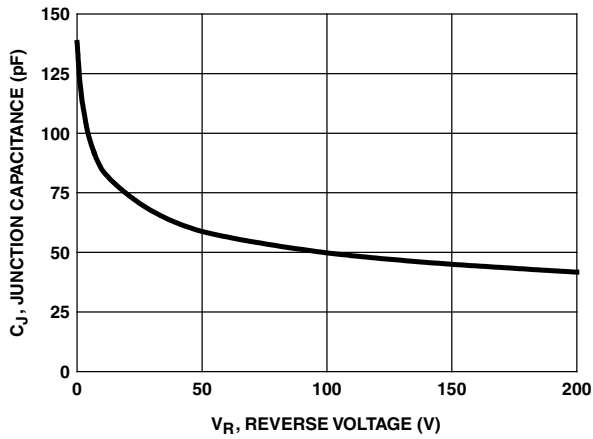


Figure 6. Current Derating Curve



Typical Performance Characteristics (Continued)

Figure 7. Junction Capacitance vs Reverse Voltage



Test Circuit and Waveforms

Figure 8. t_{rr} Test Circuit

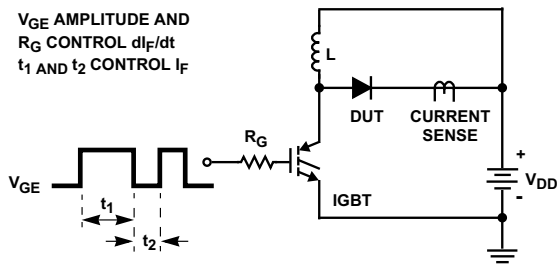


Figure 9. t_{rr} Waveforms and Definitions

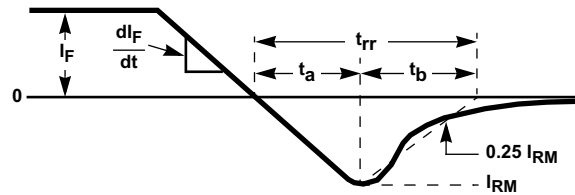


Figure 10. Avalanche Energy Test Circuit

I = 1A
 L = 40mH
 R < 0.1Ω
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$
 Q₁ = IGBT (BV_{CES} > DUT V_{R(AVL)})

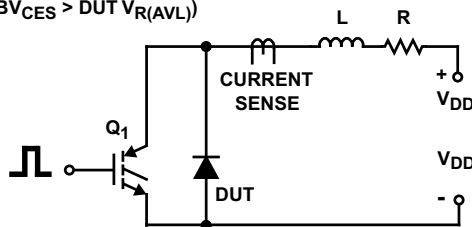
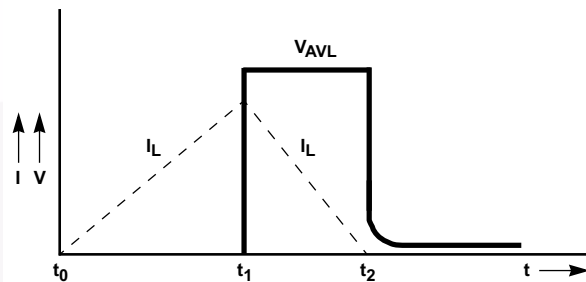


Figure 11. Avalanche Current and Voltage Waveforms





NOTES:

- A. PACKAGE REFERENCE: JEDEC TO220,ISSUE K, VARIATION AC,DATED APRIL 2002.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSION AND TOLERANCE AS PER ASME Y14.5-2009.
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