

150A, 1200V Hyperfast Diode

The RHRU150120 is a hyperfast diode with soft recovery characteristics ($t_{rr} < 100\text{ns}$). 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 TA49074.

Ordering Information

| PART NUMBER | PACKAGE | BRAND |
|-------------|---------|-----------|
| RHRU150120 | TO-218 | RHR150120 |

NOTE: When ordering, use the entire part number.

Symbol



Features

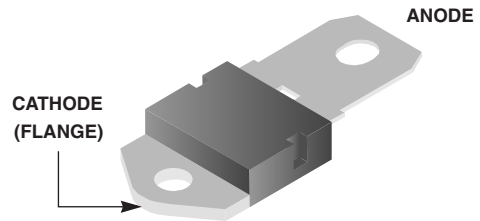
- Hyperfast with Soft Recovery <100ns
- Operating Temperature 175°C
- Reverse Voltage 1200V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplier
- Power Switching Circuits
- General Purpose

Packaging

SINGLE LEAD JEDEC STYLE TO-218



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, Unless Otherwise Specified

| | RHRU150120 | 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 $I_{F(AV)}$ $T_C = 37.5^\circ\text{C}$ | 150 | A |
| Repetitive Peak Surge Current I_{FRM} (Square Wave, 20kHz) | 300 | A |
| Nonrepetitive Peak Surge Current I_{FSM} (Halfwave, 1 phase, 60Hz) | 1500 | A |
| Maximum Power Dissipation P_D | 375 | W |
| Avalanche Energy (See Figures 10 and 11) E_{AVL} | 50 | mJ |
| Operating and Storage Temperature T_{STG}, T_J | -65 to 175 | °C |

Electrical Specifications $T_C = 25^\circ\text{C}$, Unless Otherwise Specified

| SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNITS |
|-----------------|--|-----|-----|-----|---------------------------|
| V_F | $I_F = 150\text{A}$ | - | - | 3.2 | V |
| | $I_F = 150\text{A}, T_C = 150^\circ\text{C}$ | - | - | 2.6 | V |
| I_R | $V_R = 1200\text{V}$ | - | - | 250 | μA |
| | $V_R = 1200\text{V}, T_C = 150^\circ\text{C}$ | - | - | 3.0 | mA |
| t_{rr} | $I_F = 1\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$ | - | - | 100 | ns |
| | $I_F = 150\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$ | - | - | 125 | ns |
| t_a | $I_F = 150\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$ | - | 70 | - | ns |
| t_b | $I_F = 150\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$ | - | 40 | - | ns |
| Q_{RR} | $I_F = 150\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$ | - | 460 | - | nC |
| C_J | $V_R = 10\text{V}, I_F = 0\text{A}$ | - | 420 | - | pF |
| $R_{\theta JC}$ | | - | - | 0.4 | $^\circ\text{C}/\text{W}$ |

DEFINITIONS

V_F = Instantaneous forward voltage ($pw = 300\mu\text{s}, D = 2\%$).

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

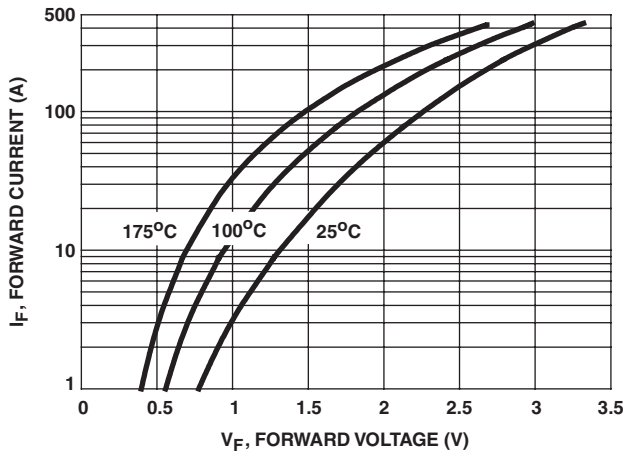


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

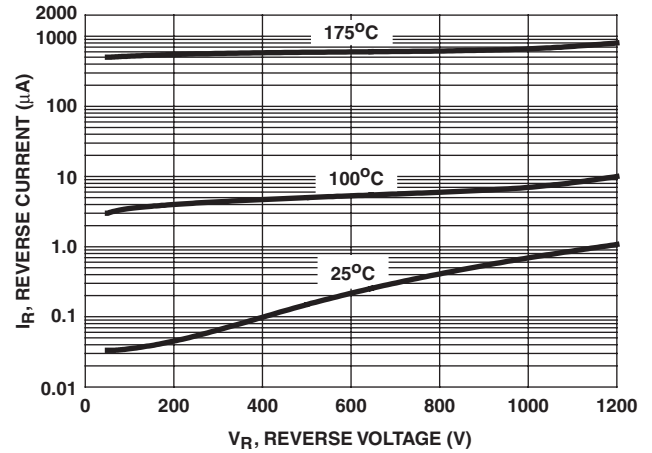


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

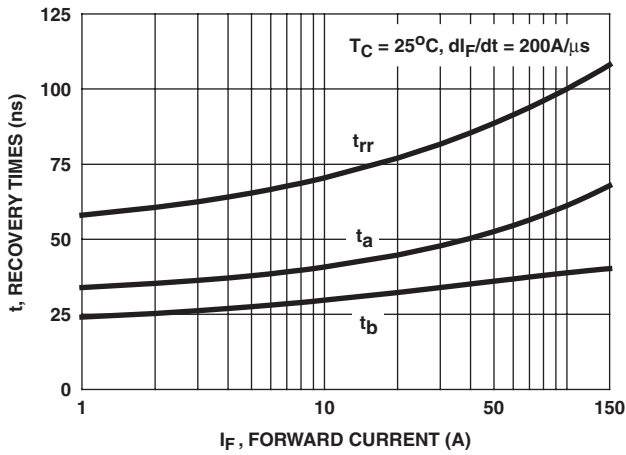


FIGURE 3. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

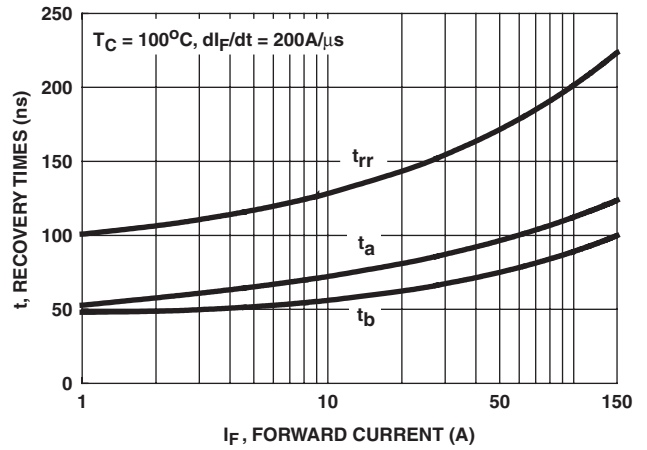


FIGURE 4. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

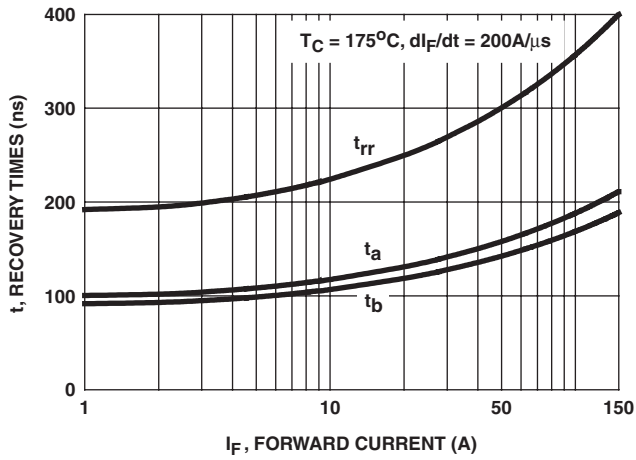


FIGURE 5. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

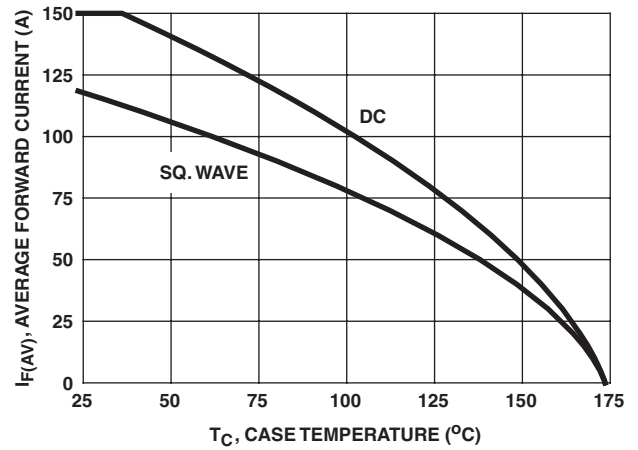


FIGURE 6. CURRENT DERATING CURVE

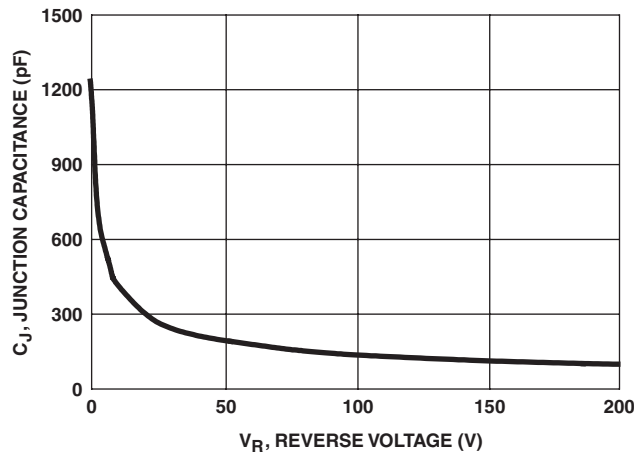


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

V_{GE} AMPLITUDE AND
 R_G CONTROL di_F/dt
 t_1 AND t_2 CONTROL I_F

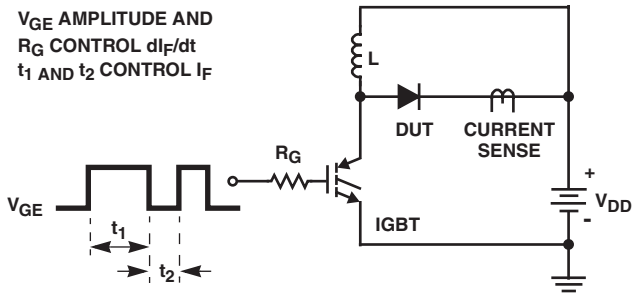


FIGURE 8. t_{rr} TEST CIRCUIT

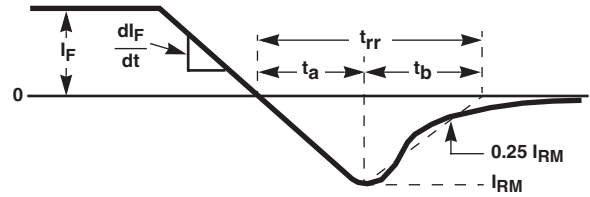


FIGURE 9. t_{rr} WAVEFORMS AND DEFINITIONS

$I_{MAX} = 1.6A$
 $L = 40mH$
 $R < 0.1\Omega$
 $E_{AVL} = 1/2Li^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$
 $Q_1 = IGBT (BV_{CES} > DUT V_{R(AVL)})$

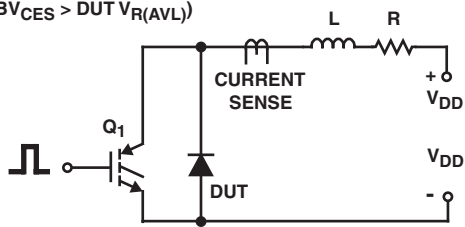


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

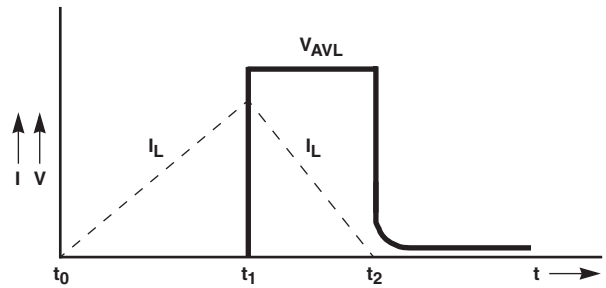


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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