

## 30A, 1200V Hyperfast Diode

The RHRP30120 is a hyperfast diode with soft recovery characteristics ( $t_{rr} < 65\text{ns}$ ). 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 high frequency 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 TA49041.

## Ordering Information

PART NUMBER	PACKAGE	BRAND
RHRP30120	TO-220AC	RHR30120

NOTE: When ordering, use the entire part number.

## Symbol



## Features

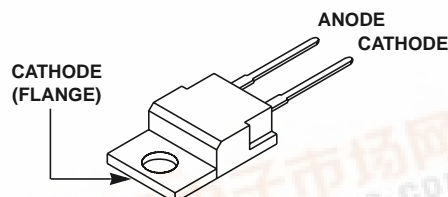
- Hyperfast with Soft Recovery . . . . . <65ns
- Operating Temperature . . . . . 175°C
- Reverse Voltage . . . . . 1200V
- Avalanche Energy Rated
- Planar Construction

## Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

## Packaging

**JEDEC TO-220AC**



## Absolute Maximum Ratings $T_C = 25^\circ\text{C}$

	RHRP30120	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 . . . . . $I_{F(AV)}$ ( $T_C = 78^\circ\text{C}$ )	30	A
Repetitive Peak Surge Current . . . . . $I_{FRM}$ (Square Wave, 20kHz)	60	A
Nonrepetitive Peak Surge Current . . . . . $I_{FSM}$ (Halfwave, 1 Phase, 60Hz)	300	A
Maximum Power Dissipation . . . . . $P_D$	125	W
Avalanche Energy (See Figures 7 and 8) . . . . . $E_{AVL}$	30	mJ
Operating and Storage Temperature . . . . . $T_{STG}, T_J$	-65 to 175	°C

RHRP30120

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
$V_F$	$I_F = 30\text{A}$	-	-	3.2	V
	$I_F = 30\text{A}, T_C = 150^{\circ}\text{C}$	-	-	2.6	V
$I_R$	$V_R = 1200\text{V}$	-	-	250	$\mu\text{A}$
	$V_R = 1200\text{V}, T_C = 150^{\circ}\text{C}$	-	-	1	mA
$t_{rr}$	$I_F = 1\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	65	ns
	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	75	ns
$t_a$	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	48	-	ns
$t_b$	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	22	-	ns
$R_{\theta JC}$		-	-	1.2	$^{\circ}\text{C}/\text{W}$

DEFINITIONS

- $V_F$  = Instantaneous forward voltage ( $p_w = 300\mu\text{s}$ ,  $D = 2\%$ ).
- $I_R$  = Instantaneous reverse current.
- $t_{rr}$  = Reverse recovery time (See Figure 6), summation of  $t_a + t_b$ .
- $t_a$  = Time to reach peak reverse current (See Figure 6).
- $t_b$  = 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 6).
- $R_{\theta JC}$  = Thermal resistance junction to case.
- $p_w$  = pulse width.
- $D$  = duty cycle.

Typical Performance Curves

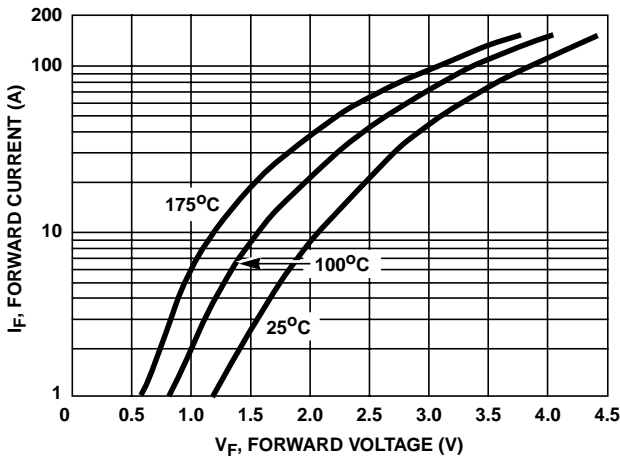


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

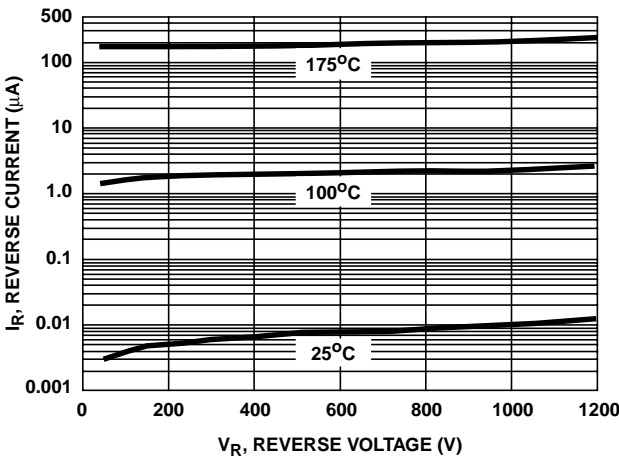


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

# Typical Performance Curves (Continued)

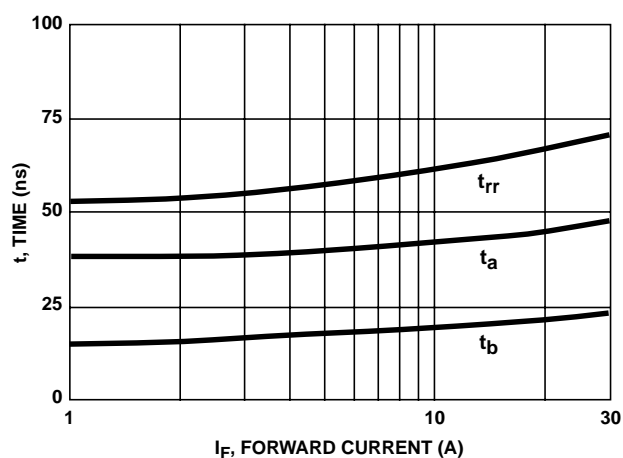


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

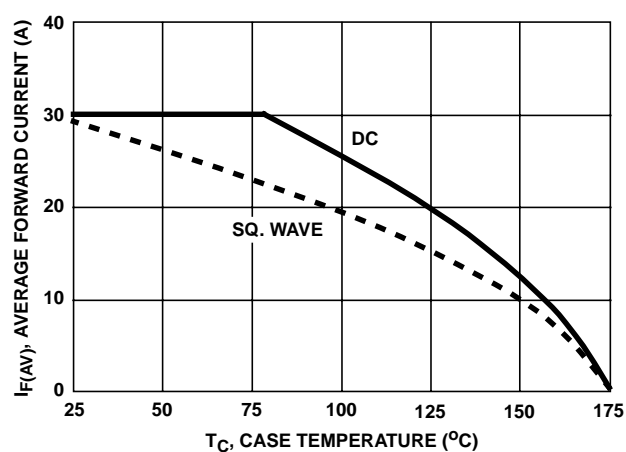


FIGURE 4. CURRENT DERATING CURVE

# Test Circuits and Waveforms

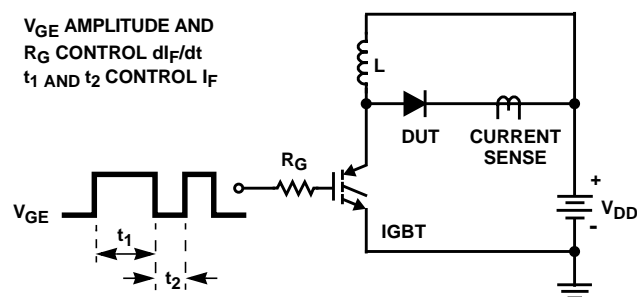


FIGURE 5.  $t_{rr}$  TEST CIRCUIT

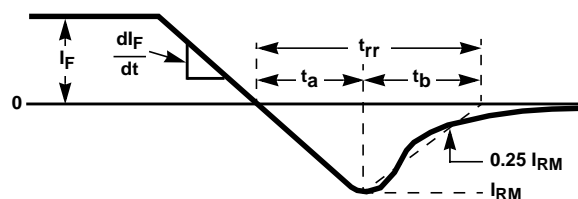


FIGURE 6.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

$I_{MAX} = 1.225A$   
 $L = 40mH$   
 $R < 0.1\Omega$   
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q_1 = IGBT (BV_{CES} > DUT V_{R(AVL)})$

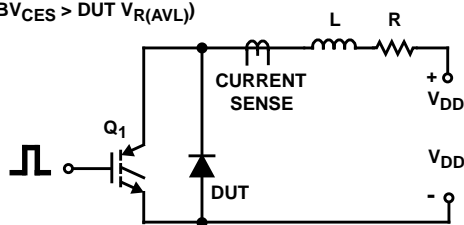


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

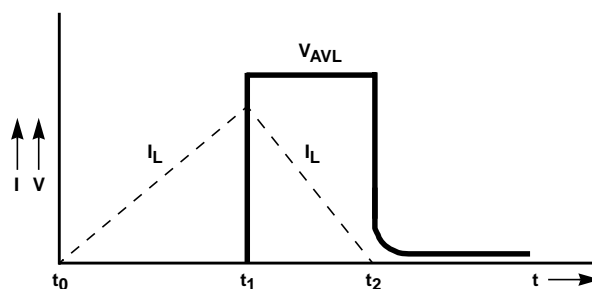


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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