



## 30 A, 1200 V, Hyperfast Diode

The RHRP30120 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.

### Ordering Information

PART NUMBER	PACKAGE	BRAND
RHRP30120	TO-220AC	RHR30120

NOTE: When ordering, use the entire part number.

### Symbol



### Features

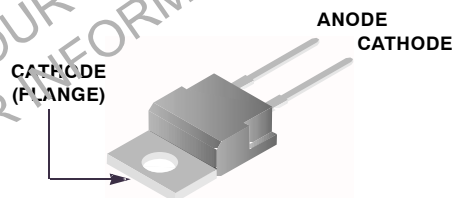
- Hyperfast Recovery  $t_{rr} = 85$  ns (@  $I_F = 30$  A)
- Max Forward Voltage,  $V_F = 3.2$  V (@  $T_J = 25^\circ\text{C}$ )
- 1200 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS Compliant

### Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

### Packaging

JEDEC TO-220AC



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

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

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
$V_F$	$I_F = 30\text{ A}$	–	–	3.2	V
	$I_F = 30\text{ A}, T_C = 150^\circ\text{C}$	–	–	.2	V
$I_R$	$V_R = 1200\text{ V}$	–	–	250	mA
	$V_R = 1200\text{ V}, T_C = 150^\circ\text{C}$	–	–	1	mA
$t_{rr}$	$I_F = 1\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$	–	–	55	ns
	$I_F = 30\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$	–	–	55	ns
$t_a$	$I_F = 30\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$	–	4	–	ns
$t_b$	$I_F = 30\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$	–	2	–	ns
$R_{\theta JC}$		–	–	.2	$^\circ\text{C}/\text{W}$

DEFINITIONS

- $V_F$  = Instantaneous forward voltage ( $p_w = 300\text{ }\mu\text{s}, D = 2\%$ ).
- $I_R$  = 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 projected zero crossing of  $I_{RM}$  back to  $I_{RM}$  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

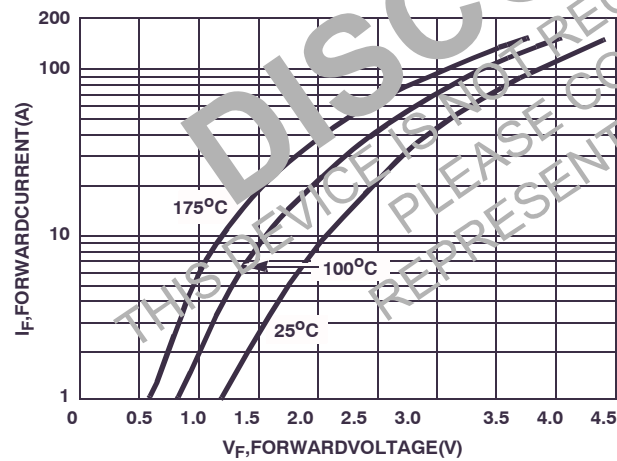


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

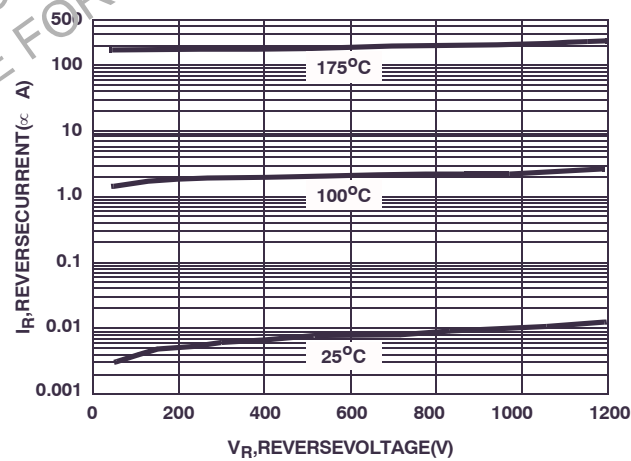


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

# Typical Performance Curves (Continued)

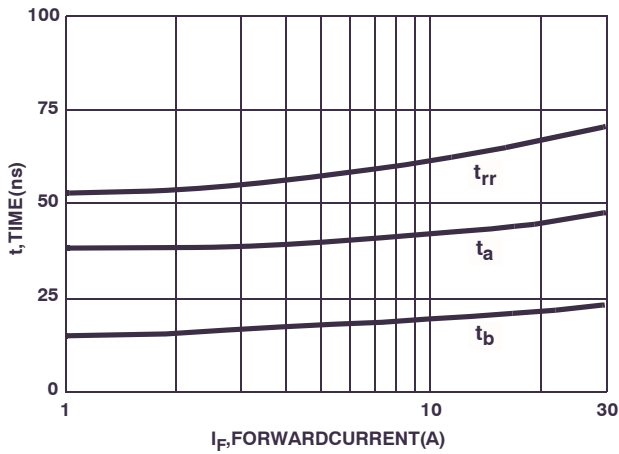
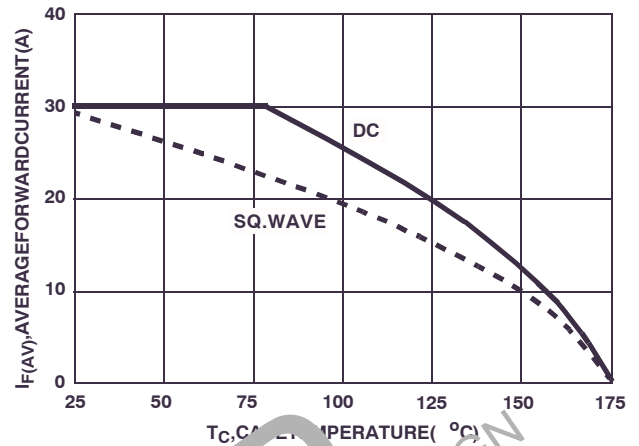
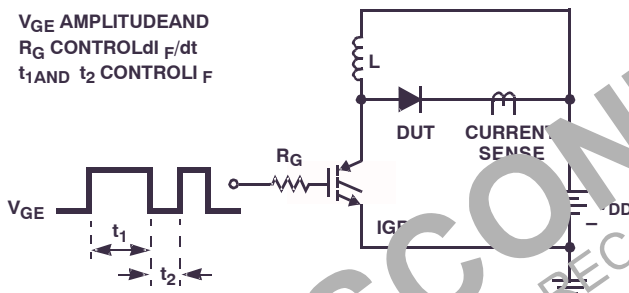
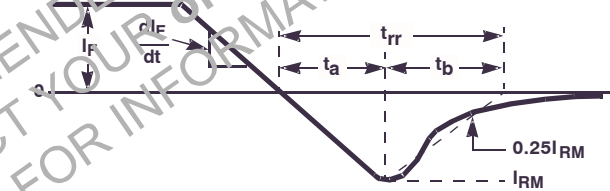
FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES VS FORWARD CURRENT

FIGURE 4. CURRENT DERATING CURVE

## Test Circuits and Waveforms

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

FIGURE 5.  $t_{rr}$  TEST CIRCUITFIGURE 6.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

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

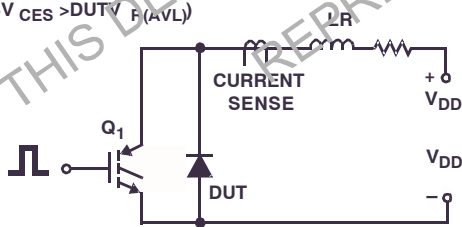


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

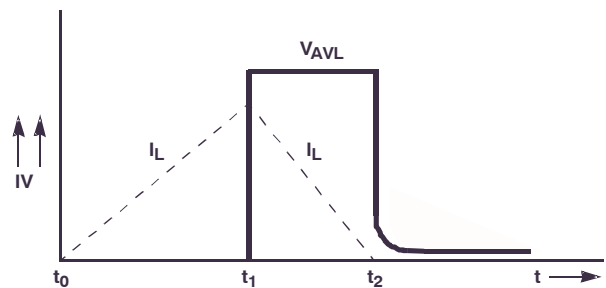



FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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