

30A, 1000V Hyperfast Diode

The RHRP30100 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 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 TA49064.

Ordering Information

PART NUMBER	PACKAGE	BRAND
RHRP30100	TO-220AC	RHR30100

NOTE: When ordering, use the entire part number.

Symbol



Features

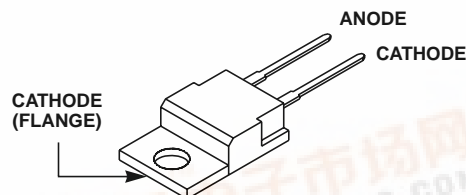
- Hyperfast with Soft Recovery <65ns
- Operating Temperature 175°C
- Reverse Voltage 1000V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Packaging

JEDEC TO-220AC



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

	RHRP30100	UNITS
Peak Repetitive Reverse Voltage	V_{RRM} 1000	V
Working Peak Reverse Voltage	V_{RWM} 1000	V
DC Blocking Voltage	V_R 1000	V
Average Rectified Forward Current ($T_C = 95^\circ\text{C}$)	$I_{F(AV)}$ 30	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FRM} 70	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz)	I_{FSM} 325	A
Maximum Power Dissipation	P_D 125	W
Avalanche Energy (See Figures 10 and 11)	E_{AVL} 20	mJ
Operating and Storage Temperature	T_{STG}, T_J -65 to 175	°C



RHRP30100

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
V_F	$I_F = 30\text{A}$	-	-	3.0	V
	$I_F = 30\text{A}, T_C = 150^\circ\text{C}$	-	-	2.5	V
I_R	$V_R = 1000\text{V}$	-	-	250	μA
	$V_R = 1000\text{V}, T_C = 150^\circ\text{C}$	-	-	1.0	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	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	35	-	ns
t_b	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	33	-	ns
Q_{RR}	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	200	-	nC
C_J	$V_R = 10\text{V}, I_F = 0\text{A}$	-	100	-	pF
$R_{\theta JC}$		-	-	1.2	$^\circ\text{C}/\text{W}$

DEFINITIONS

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

I_R = Instantaneous reverse current.

t_{rr} = Reverse recovery time (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

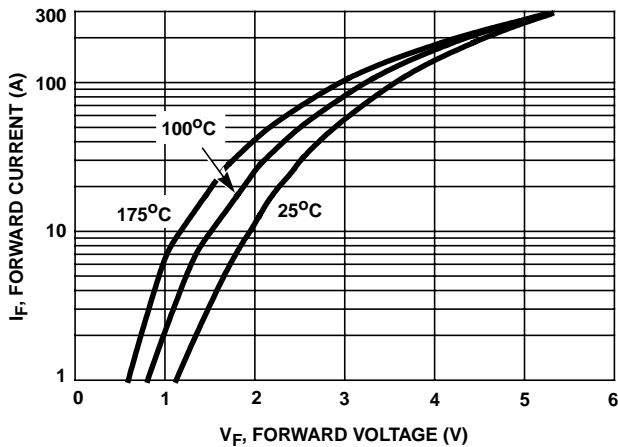


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

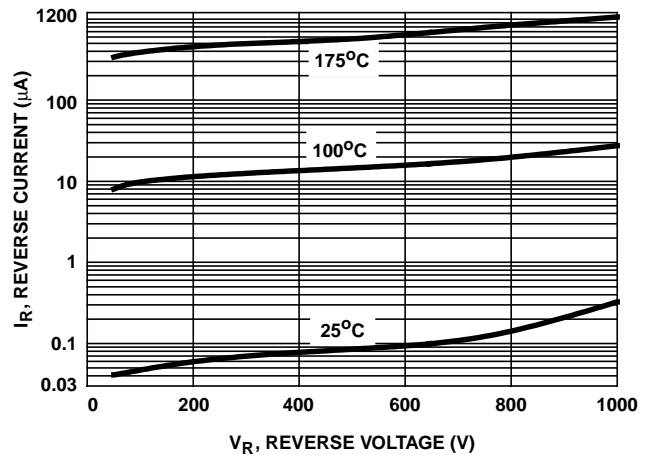


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

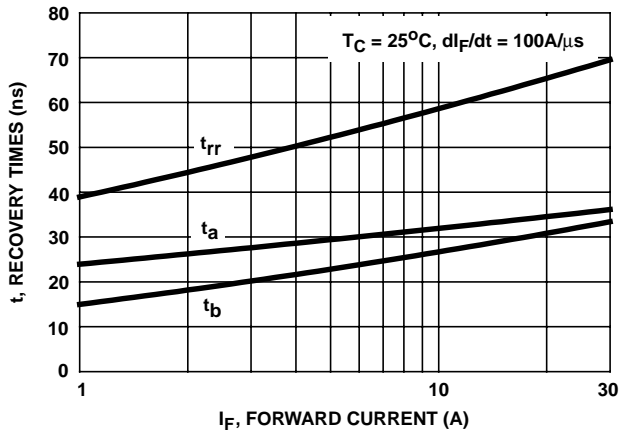


FIGURE 3. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

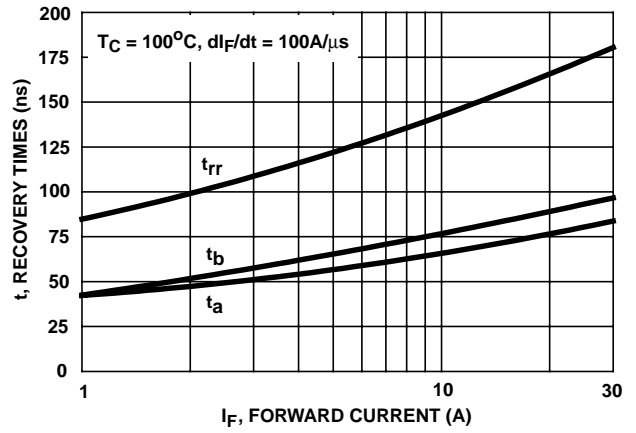


FIGURE 4. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

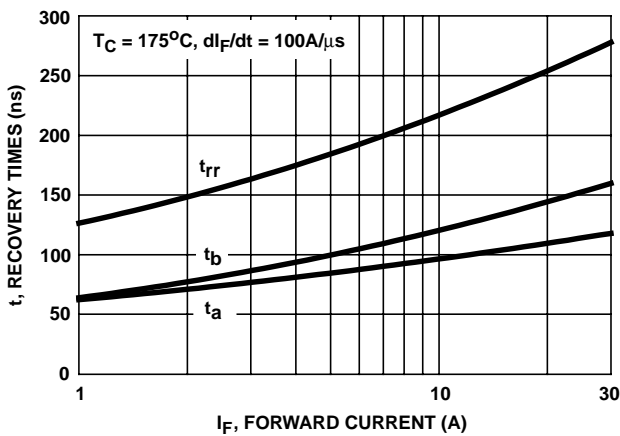


FIGURE 5. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

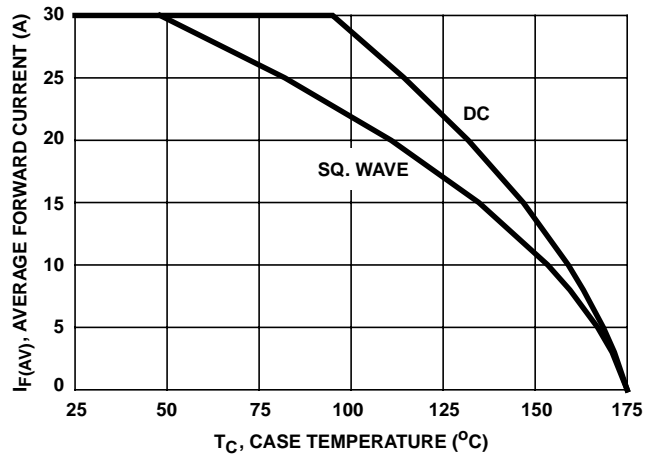


FIGURE 6. CURRENT DERATING CURVE

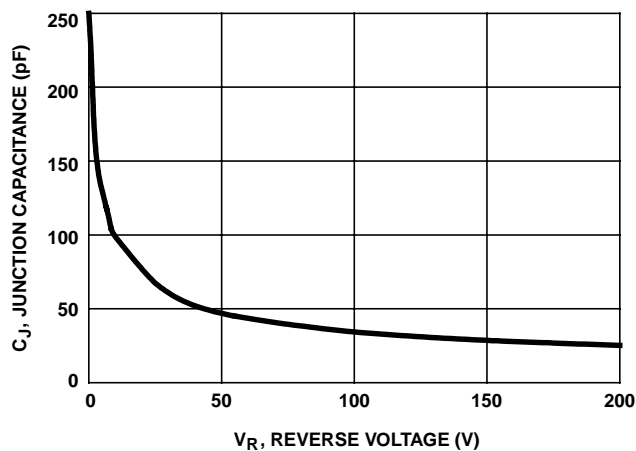


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

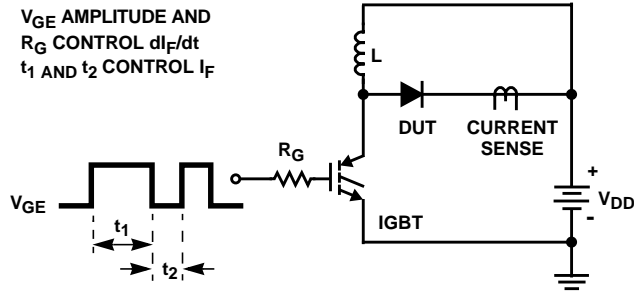


FIGURE 8. t_{rr} TEST CIRCUIT

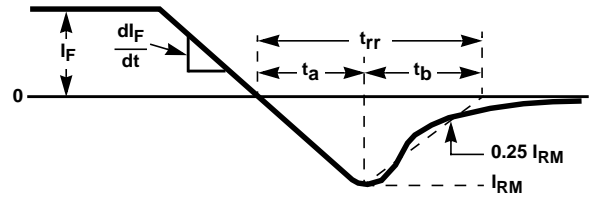


FIGURE 9. t_{rr} WAVEFORMS AND DEFINITIONS

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

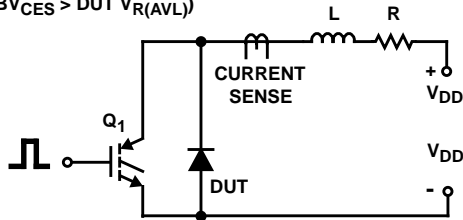


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

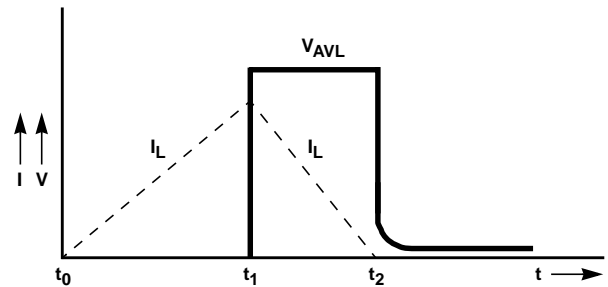


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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