

### **30A, 1200V Ultrafast Diode**

The RURP30120 is an ultrafast diode with soft recovery characteristic ( $t_{rr} < 110\text{ns}$ ). It has low forward voltage drop and is 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 ultrafast recovery with soft recovery characteristic minimize ringing and electrical noise in many power switching circuits, reducing power loss in the switching transistors.

Formerly developmental type TA49031.

### **Ordering Information**

PART NUMBER	PACKAGE	BRAND
RURP30120	TO-220AC	RUR30120

NOTE: When ordering, use the entire part number.

### **Symbol**



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

	RURP30120	UNITS
Peak Repetitive Reverse Voltage .....	$V_{RRM}$	V
Working Peak Reverse Voltage .....	$V_{RWM}$	V
DC Blocking Voltage .....	$V_R$	V
Average Rectified Forward Current .....	$I_{F(AV)}$	A
( $T_C = 110^\circ\text{C}$ )		
Repetitive Peak Surge Current .....	$I_{FRM}$	A
(Square Wave, 20kHz)		
Nonrepetitive Peak Surge Current .....	$I_{FSM}$	A
(Halfwave, 1 Phase, 60Hz)		
Maximum Power Dissipation .....	$P_D$	W
Avalanche Energy (See Figures 7 and 8) .....	$E_{AVL}$	mJ
Operating and Storage Temperature .....	$T_{STG}, T_J$	$^\circ\text{C}$
	-65 to 175	

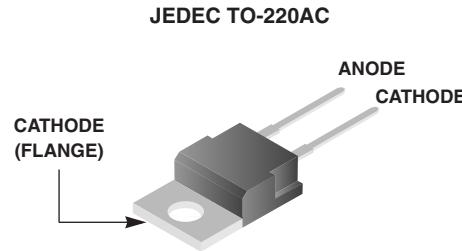
### **Features**

- Ultrafast with Soft Recovery..... <110ns
- Operating Temperature ..... 175°C
- Reverse Voltage ..... 1200V
- Avalanche Energy Rated
- Planar Construction

### **Applications**

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

### **Packaging**



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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
$V_F$	$I_F = 30\text{A}$	-	-	2.1	V
	$I_F = 30\text{A}, T_C = 150^\circ\text{C}$	-	-	1.9	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
$t_{rr}$	$I_F = 1\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	110	ns
	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	150	ns
$t_a$	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	90	-	ns
$t_b$	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	45	-	ns
$R_{\theta\text{JC}}$		-	-	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 (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).

$R_{\theta\text{JC}}$  = Thermal resistance junction to case.

pw = Pulse width.

D = Duty cycle.

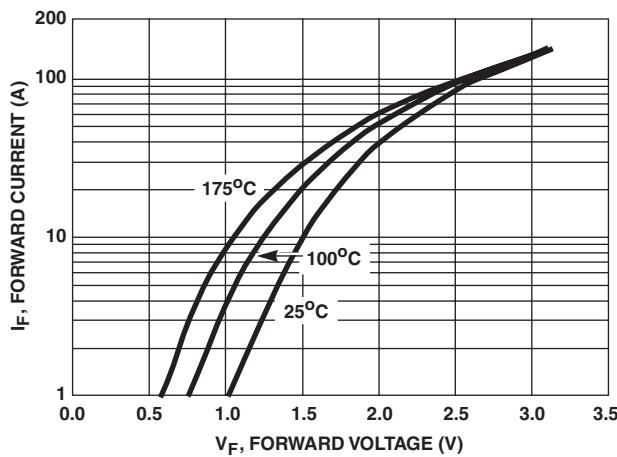
**Typical Performance Curves**

FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

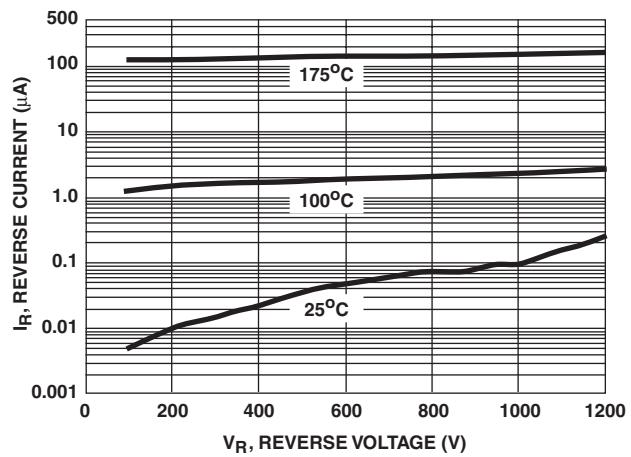


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

## Typical Performance Curves (Continued)

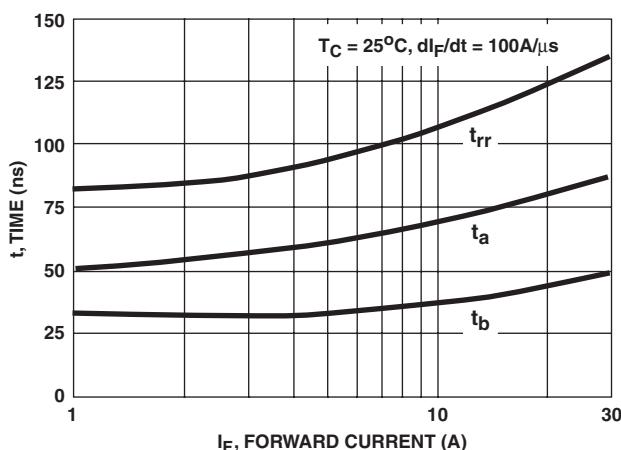
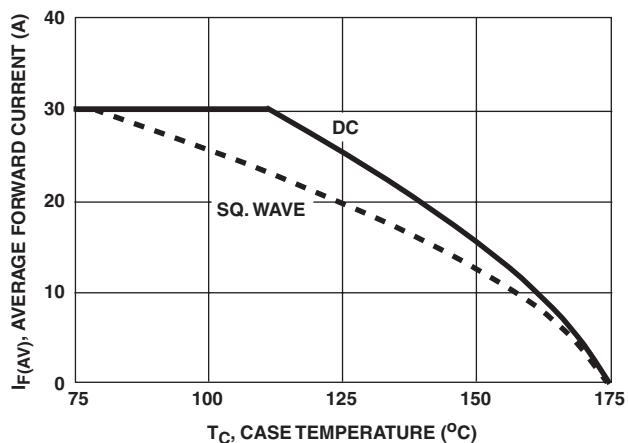
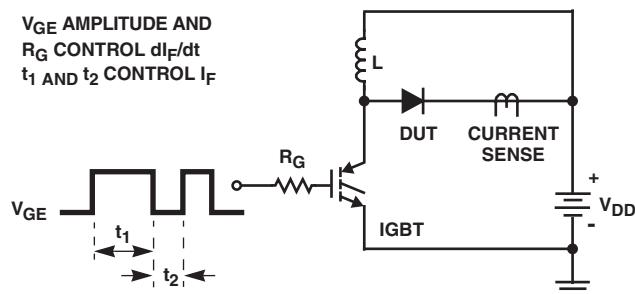
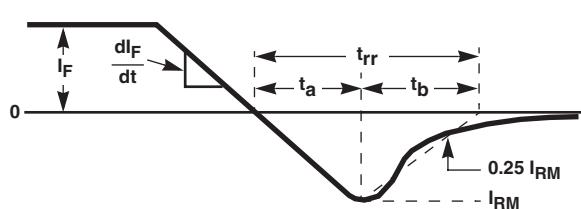
FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

FIGURE 4. CURRENT DERATING CURVE

## Test Circuits and Waveforms

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

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

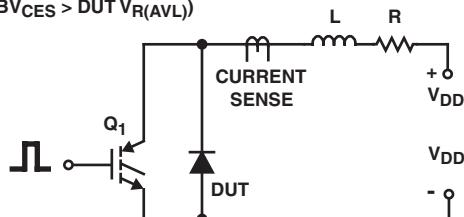


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

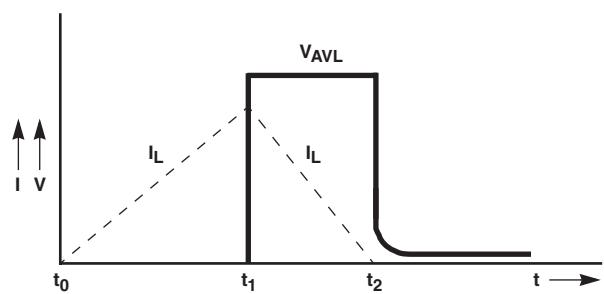


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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