

**6A, 1200V Ultrafast Diodes**

The RURD6120 and RURD6120S are ultrafast diodes with soft recovery characteristics ( $t_{rr} < 70\text{ns}$ ). They have low forward voltage drop and are silicon nitride passivated ion-implanted epitaxial planar construction.

These devices are intended for use as freewheeling/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast soft recovery minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

Formerly development type TA49039.

**Ordering Information**

PART NUMBER	PACKAGE	BRAND
RURD6120	TO-251	UR6120
RURD6120S	TO-252	UR6120

NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-252 variant in the tape and reel, i.e., RURD6120S9A.

**Symbol**



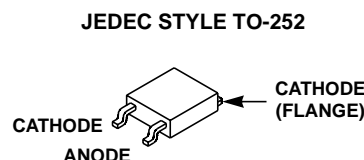
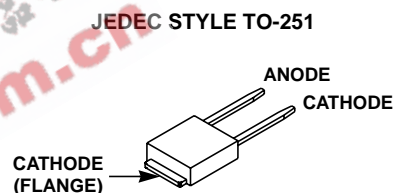
**Features**

- Ultrafast with Soft Recovery . . . . . <70ns
- Operating Temperature . . . . . 175°C
- Reverse Voltage . . . . . 1200V
- Avalanche Energy Rated
- Planar Construction

**Applications**

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

**Packaging**



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

	RURD6120	RURD6120S	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 . . . . . $I_{F(AV)}$ ( $T_C = 140^\circ\text{C}$ )	6		A
Repetitive Peak Surge Current . . . . . $I_{FRM}$ (Square Wave, 200kHz)	12		A
Nonrepetitive Peak Surge Current . . . . . $I_{FSM}$ (Halfwave, 1 Phase, 60Hz)	60		A
Maximum Power Dissipation . . . . . $P_D$	50		W
Avalanche Energy (See Figures 10 and 11) . . . . . $E_{AVL}$	10		mJ
Operating and Storage Temperature . . . . . $T_{STG}, T_J$	-65 to 175		°C
Maximum Lead Temperature for Soldering (Leads at 0.063 in. (1.6mm) from case for 10s) . . . . . $T_L$	300		°C
Package Body for 10s, see Tech Brief 334 . . . . . $T_{PKG}$	260		°C

## RURD6120, RURD6120S

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
$V_F$	$I_F = 6\text{A}$	-	-	2.1	V
	$I_F = 6\text{A}, T_C = 150^\circ\text{C}$	-	-	1.9	V
$I_R$	$V_R = 1200\text{V}$	-	-	100	$\mu\text{A}$
	$V_R = 1200\text{V}, T_C = 150^\circ\text{C}$	-	-	500	$\mu\text{A}$
$t_{rr}$	$I_F = 1\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	-	70	ns
	$I_F = 6\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	-	90	ns
$t_a$	$I_F = 6\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	45	-	ns
$t_b$	$I_F = 6\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	30	-	ns
$Q_{RR}$	$I_F = 6\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	400	-	nC
$C_J$	$V_R = 10\text{V}, I_F = 0\text{A}$	-	22	-	pF
$R_{\theta JC}$		-	-	3	$^\circ\text{C}/\text{W}$

#### 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

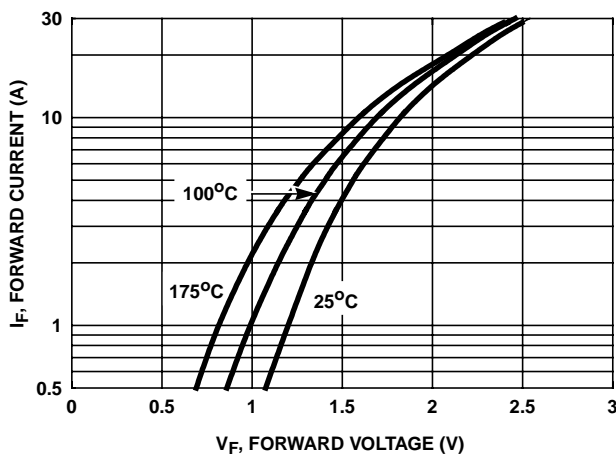


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

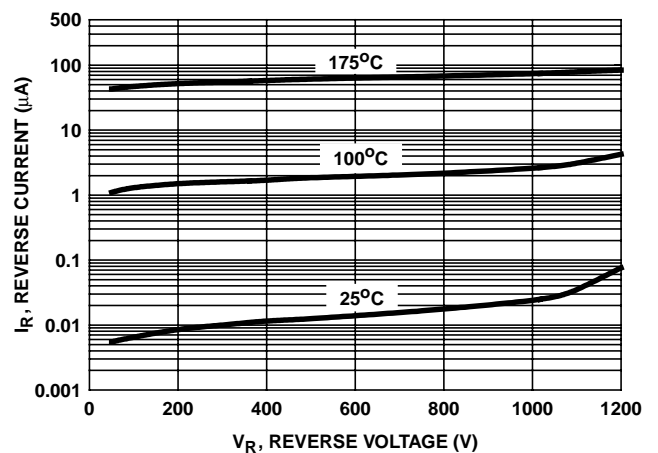


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

## RURD6120, RURD6120S

### Typical Performance Curves (Continued)

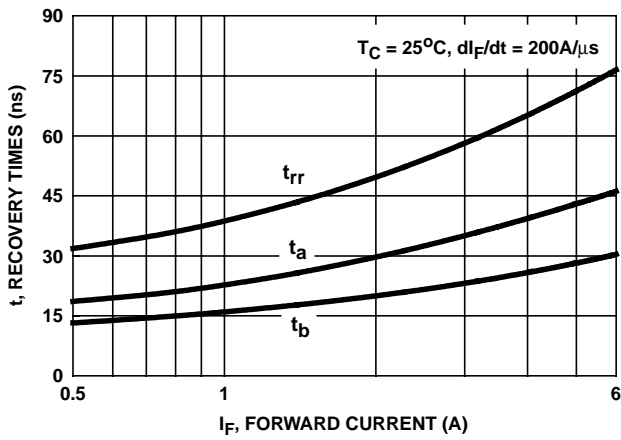


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

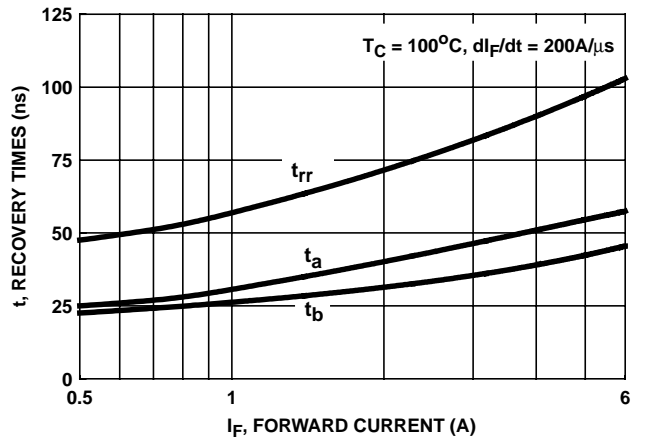


FIGURE 4.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

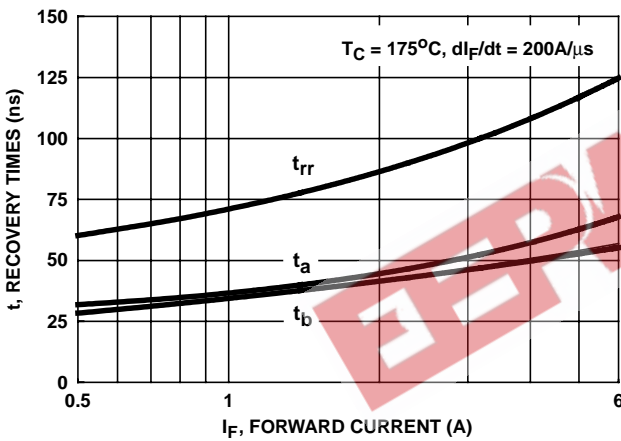


FIGURE 5.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

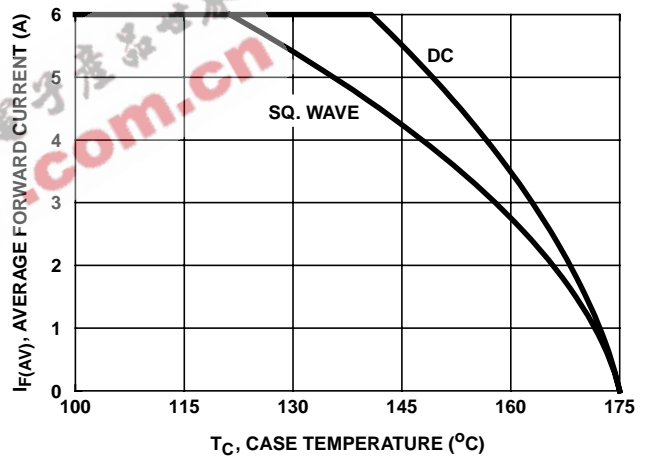


FIGURE 6. CURRENT DERATING CURVE

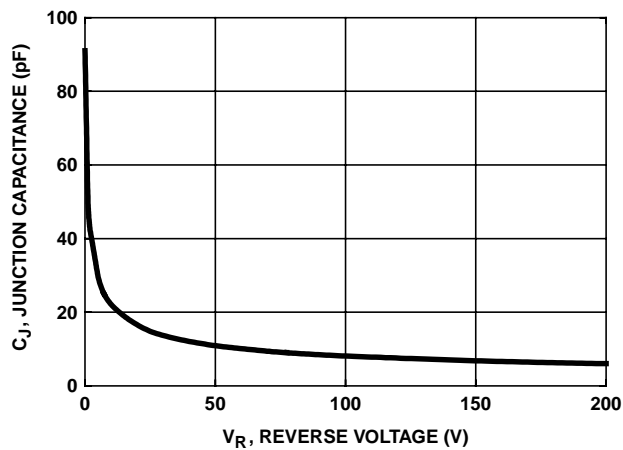


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

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

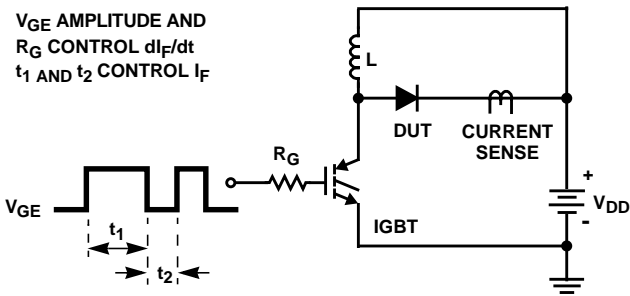


FIGURE 8.  $t_{rr}$  TEST CIRCUIT

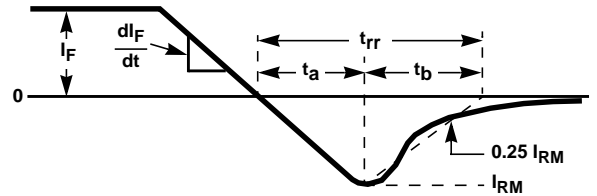


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

$I = 1A$   
 $L = 20mH$   
 $R < 0.1\Omega$   
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q_1 = IGBT (BV_{CES} > DUT V_{R(AVL)})$

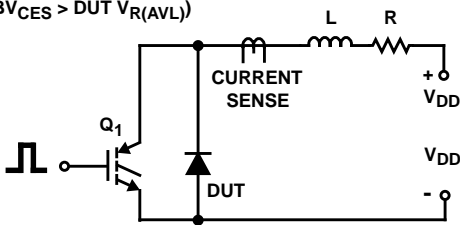


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

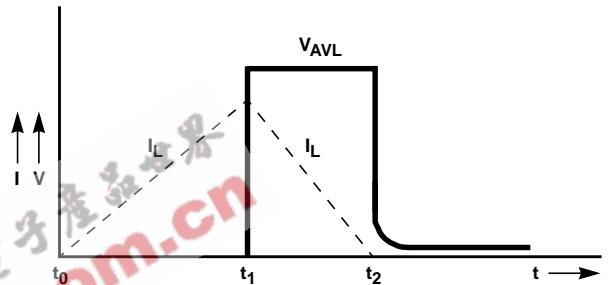


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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