

## 4 A, 1200 V, Ultrafast Diode

The RURD4120S9A is an Ultrafast Diode with low forward voltage drop. This device is intended for use as freewheeling and clamping Diodes in a variety of switching power supplies and other power switching applications. It is specially suited for use in switching power supplies and industrial application.

### Features

- Stealth Recovery  $t_{rr} = 90$  ns (@  $I_F = 4$  A)
- Max Forward Voltage,  $V_F = 2.1$  V (@  $T_C = 25^\circ\text{C}$ )
- 1200 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS Compliant

### Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

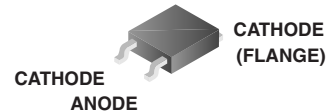
### Ordering Information

PART NUMBER	PACKAGE	BRAND
RURD4120S9A_SB82080	TO-252	UR4120

### Symbol



JEDEC STYLE TO-252



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

	RURD4120S9A_SB82080	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 .....	$I_{F(AV)}$ 4	A
( $T_C = 152^\circ\text{C}$ )		
Repetitive Peak Surge Current .....	$I_{FRM}$ 8	A
(Square Wave, 20 kHz)		
Nonrepetitive Peak Surge Current .....	$I_{FSM}$ 40	A
(Halfwave, 1 Phase, 60 Hz)		
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	$^\circ\text{C}$

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
$V_F$	$I_F = 4\text{ A}$	-	-	2.1	V
	$I_F = 4\text{ A}, T_C = 150^\circ\text{C}$	-	-	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
	$I_F = 4\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	-	90	ns
$t_a$	$I_F = 4\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	40	-	ns
$t_b$	$I_F = 4\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	28	-	ns
$Q_{rr}$	$I_F = 4\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	335	-	nC
$C_J$	$V_R = 10\text{ V}, I_F = 0\text{ A}$	-	15	-	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 time.
- $C_J$  = Junction capacitance.
- $R_{\theta JC}$  = Thermal resistance junction to case.
- pw = Pulse width.
- D = Duty cycle.

**Typical Performance Curves**

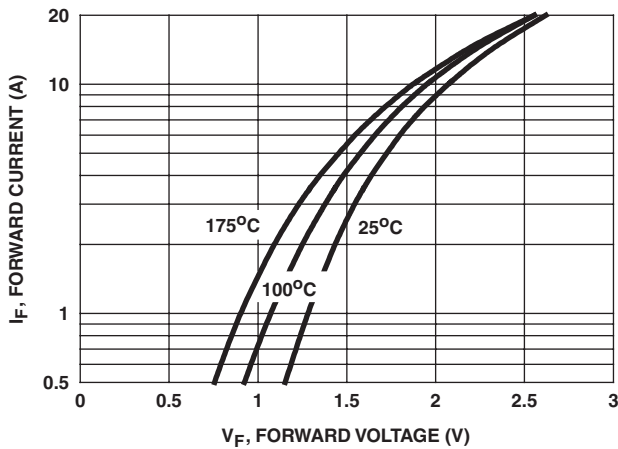


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

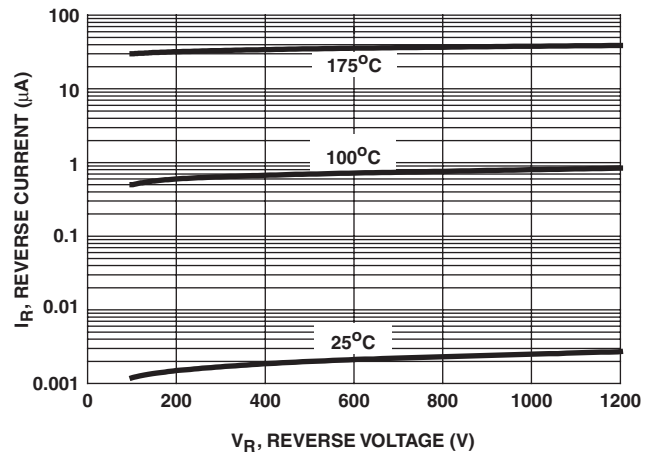


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

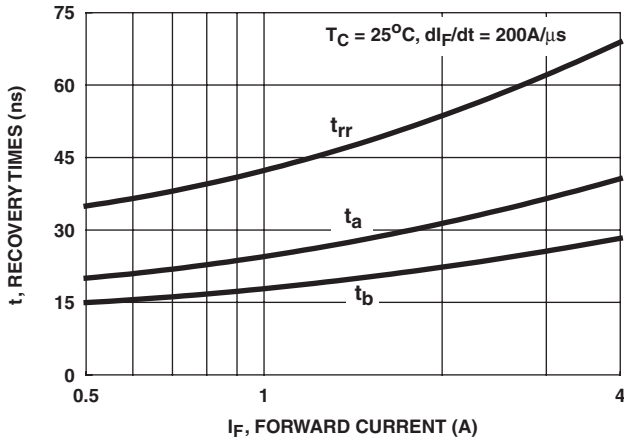


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

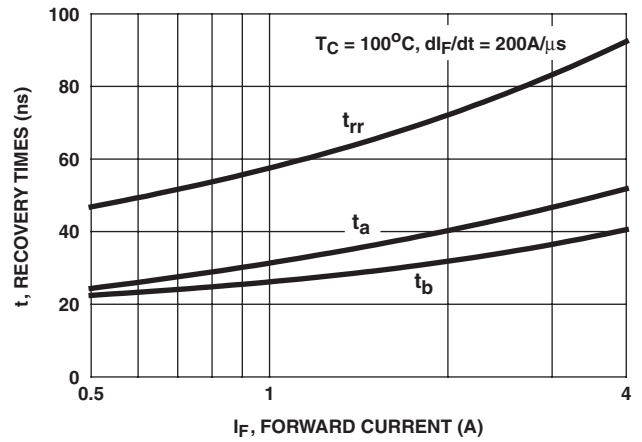


FIGURE 4.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

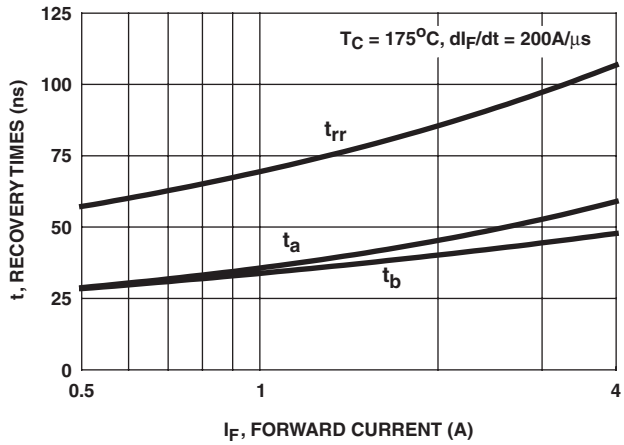


FIGURE 5.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

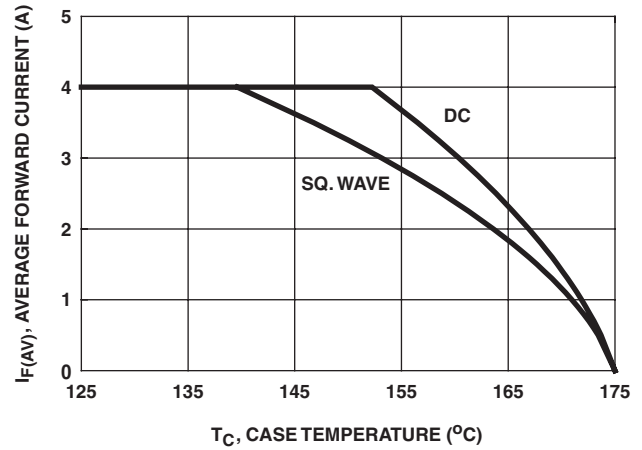


FIGURE 6. CURRENT DERATING CURVE

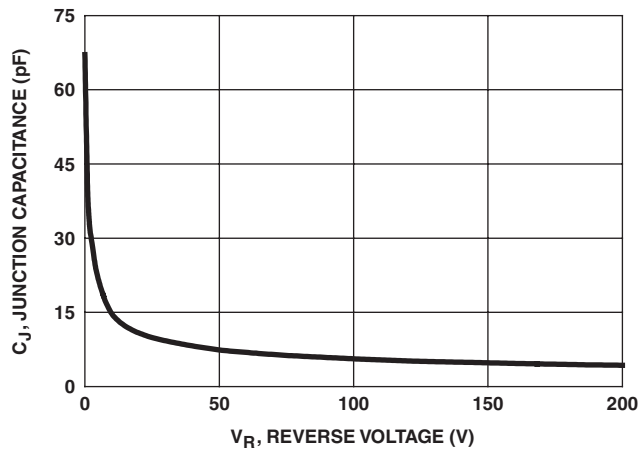


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

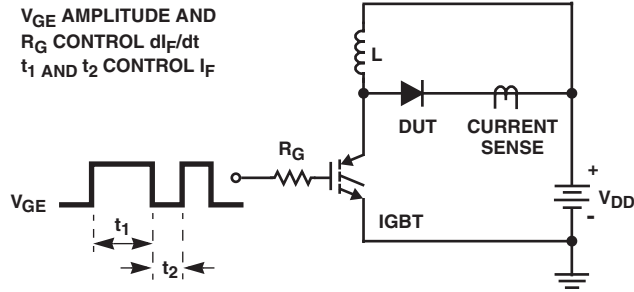


FIGURE 8.  $t_{rr}$  TEST CIRCUIT

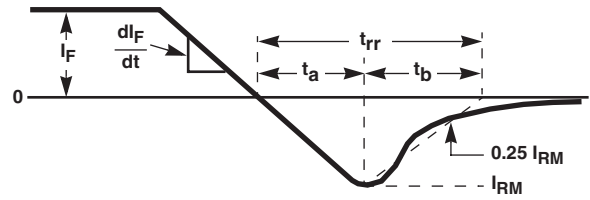


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

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

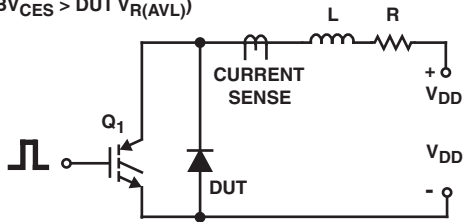


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

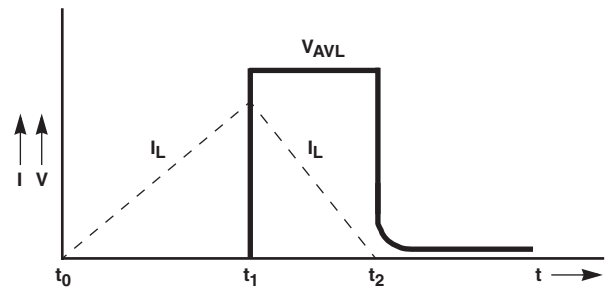

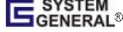





FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS



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