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4A, 1200V Ultrafast Diodes

The RURD4120S9A_F085 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 developmental type TA49036.

Ordering Information

PART NUMBER	PACKAGE	BRAND	PACKING TYPE	QUANTITY
RURD4120S9A_F085	TO-252	UR4120	Tape and Reel	2500

Symbol



Features

- Ultrafast with Soft Recovery <70ns
- Operating Temperature 175°C
- Reverse Voltage 1200V
- Avalanche Energy Rated
- Planar Construction
- Qualified to ACE Q101
- RoHS Compliant

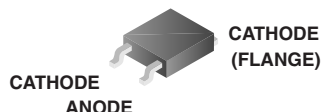


Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Packaging

JEDEC STYLE TO-252



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

	RURD4120S9A_F085	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 $I_{F(AV)}$ ($T_C = 152^\circ\text{C}$)	4	A
Repetitive Peak Surge Current I_{FRM} (Square Wave, 20kHz)	8	A
Nonrepetitive Peak Surge Current I_{FSM} (Halfwave, 1 Phase, 60Hz)	40	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

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
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	μA
	$V_R = 1200\text{V}$, $T_C = 150^\circ\text{C}$	-	-	500	μA
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 μs , 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

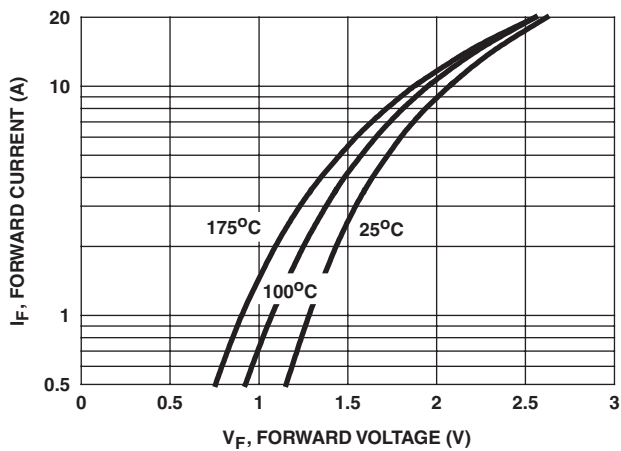


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

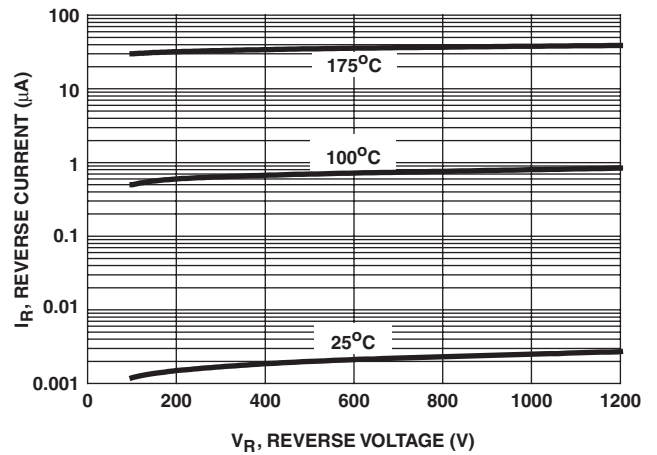


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

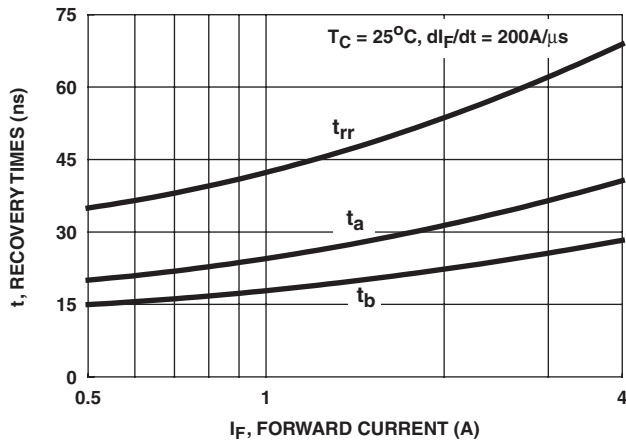


FIGURE 3. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

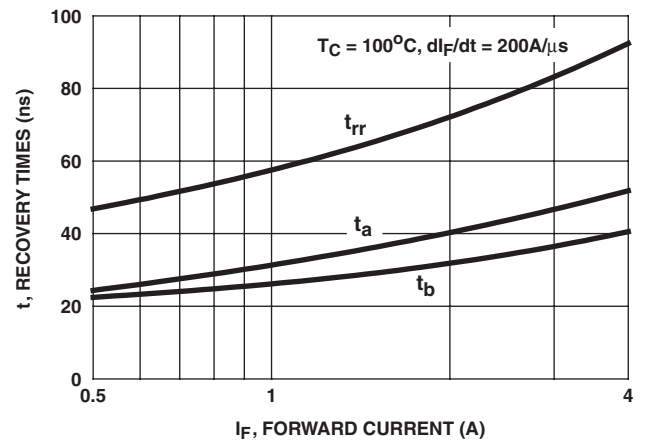


FIGURE 4. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

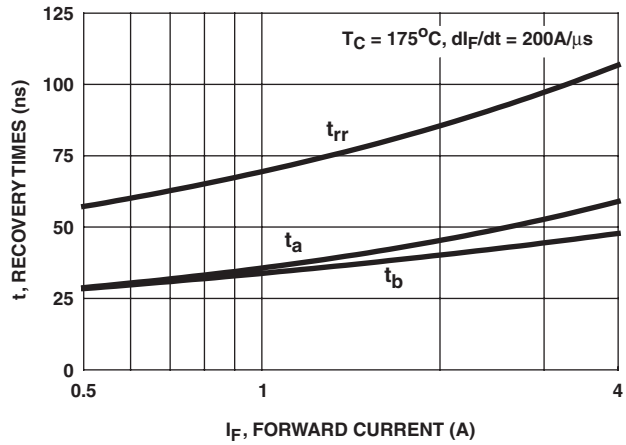


FIGURE 5. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

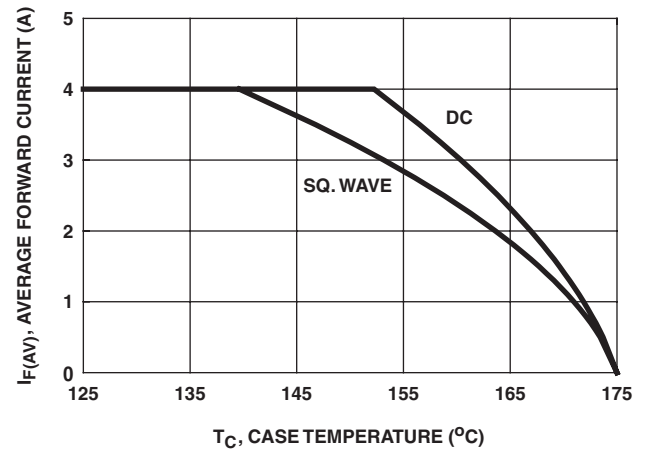


FIGURE 6. CURRENT DERATING CURVE

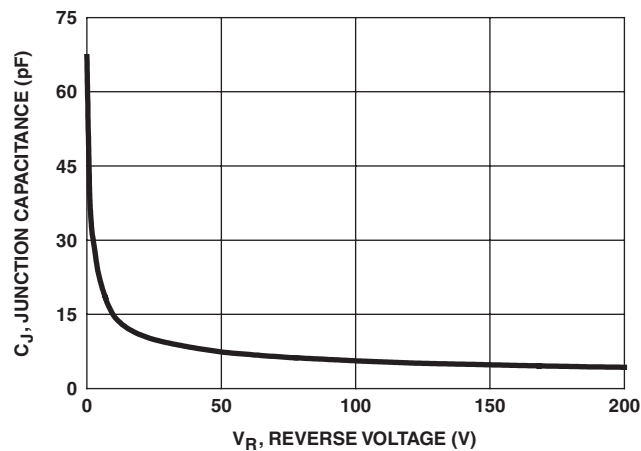


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

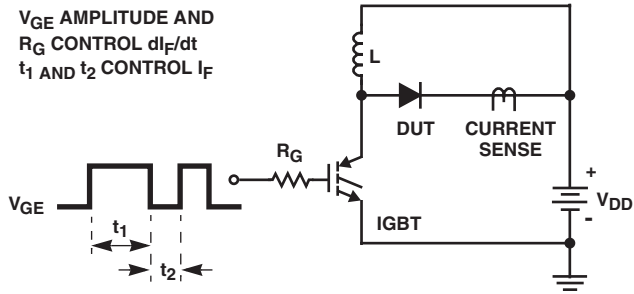


FIGURE 8. t_{rr} TEST CIRCUIT

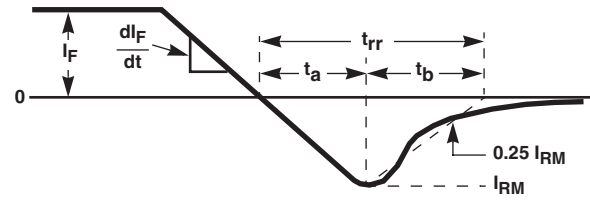


FIGURE 9. t_{rr} WAVEFORMS AND DEFINITIONS

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

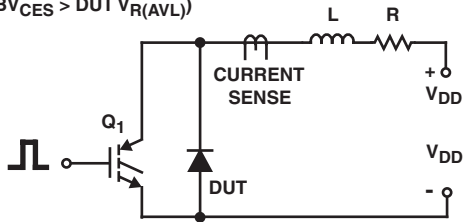


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

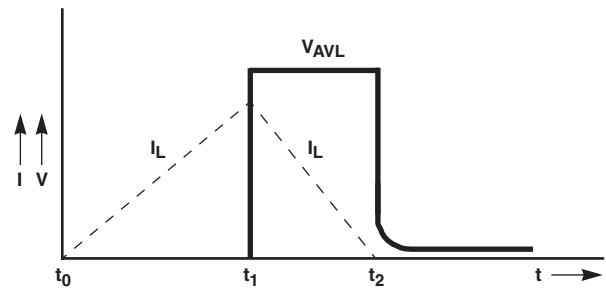


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS



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