

Data Sheet January 2000 File Number 3614.5

### 4A, 200V Ultrafast Diodes

The RURD420 and RURD420S are ultrafast diodes with soft recovery characteristics ( $t_{rr}$  < 30ns). They have low forward voltage drop and are 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 TA49034.

## **Ordering Information**

PART NUMBER	PACKAGE	BRAND
RURD420	TO-251	RUR420
RURD420S	TO-252	RUR420

NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-252 variant in tape and reel, i.e., RURD42059A.

# Symbol



### **Features**

•	Ultrafast with Soft Recovery	s
•	Operating Temperature	С
•	Reverse Voltage	V

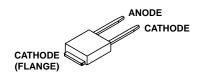
- Avalanche Energy Rated
- Planar Construction

## **Applications**

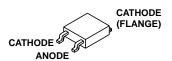
- Switching Power Supplies
- Power Switching Circuits
- · General Purpose

### **Packaging**

**JEDEC STYLE TO-251** 



JEDEC STYLE TO-252



**RURD420** 

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

	RURD420S	UNITS
Peak Repetitive Reverse VoltageV <sub>RRM</sub>	200	V
Working Peak Reverse Voltage	200	V
DC Blocking Voltage	200	V
Average Rectified Forward Current	4	Α
$(T_C = 159^{\circ}C)$		
Repetitive Peak Surge Current I <sub>FRM</sub>	8	Α
(Square Wave, 20kHz)		
Nonrepetitive Peak Surge Current	40	Α
(Halfwave, 1 Phase, 60Hz)		
Maximum Power Dissipation	30	W
Avalanche Energy (See Figures 9 and 10)	10	mJ
Operating and Storage Temperature	-65 to 175	°C
Maximum Lead Temperature for Soldering		
(Leads at 0.063 in. (1.6mm) from case for 10s)	300	°C
Package Body for 10s, see Tech Brief 334	260	oC

### RURD420, RURD420S

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
V <sub>F</sub>	I <sub>F</sub> = 4A	-	-	1.0	V
	$I_F = 4A, T_C = 150^{\circ}C$	-	-	0.83	V
I <sub>R</sub>	V <sub>R</sub> = 200V	-	-	100	μΑ
	$V_R = 200V, T_C = 150^{\circ}C$	-	-	500	μΑ
t <sub>rr</sub>	$I_F = 1A$ , $dI_F/dt = 100A/\mu s$	-	-	30	ns
	$I_F = 4A$ , $dI_F/dt = 100A/\mu s$	-	-	35	ns
t <sub>a</sub>	$I_F = 4A$ , $dI_F/dt = 100A/\mu s$	-	11	-	ns
t <sub>b</sub>	$I_F = 4A$ , $dI_F/dt = 100A/\mu s$	-	9	-	ns
Q <sub>RR</sub>	$I_F = 4A$ , $dI_F/dt = 100A/\mu s$	-	12	-	nC
СЈ	V <sub>R</sub> = 10V, I <sub>F</sub> = 0A	-	15	-	pF
$R_{ heta JC}$		-	-	5	°C/W

### **DEFINITIONS**

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

I<sub>R</sub> = Instantaneous reverse current.

 $t_{rr}$  = Reverse recovery time (See Figure 8), summation of  $t_a$  +  $t_b$ .

 $t_a$  = Time to reach peak reverse current (See Figure 8).

 $t_b$  = 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 8).

 $Q_{RR}$  = Reverse recovery charge.

 $C_J$  = Junction capacitance.

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

pw = pulse width.

D = duty cycle.

# **Typical Performance Curves**

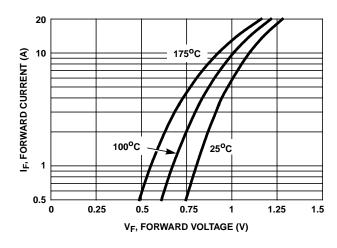


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

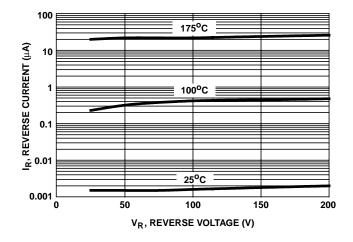


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

### Typical Performance Curves (Continued)

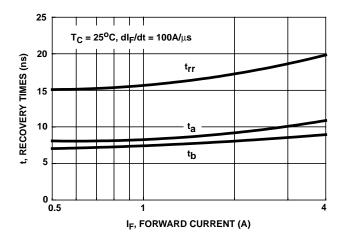


FIGURE 3.  $t_{rr}$ ,  $t_a$  and  $t_b$  curves vs forward current

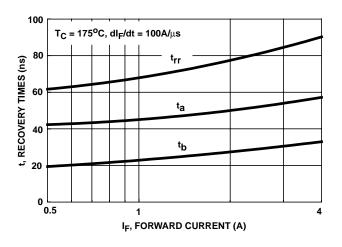


FIGURE 5.  $t_{rr}$ ,  $t_a$  and  $t_b$  curves vs forward current

Test Circuits and Waveforms

# V<sub>GE</sub> AMPLITUDE AND R<sub>G</sub> CONTROL dI<sub>F</sub>/dt t<sub>1</sub> AND t<sub>2</sub> CONTROL I<sub>F</sub> DUT CURRENT SENSE V<sub>GE</sub> V<sub>DD</sub>

FIGURE 7. t<sub>rr</sub> TEST CIRCUIT

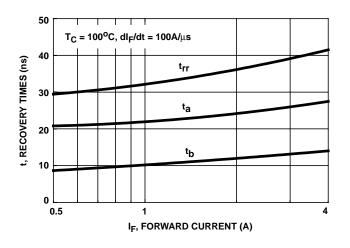


FIGURE 4.  $t_{rr}$ ,  $t_a$  and  $t_b$  curves vs forward current

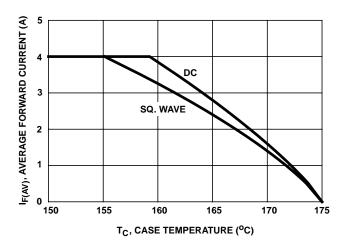


FIGURE 6. CURRENT DERATING CURVE

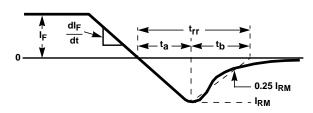


FIGURE 8. t<sub>rr</sub> WAVEFORMS AND DEFINITIONS

# Test Circuits and Waveforms (Continued)

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

FIGURE 9. AVALANCHE ENERGY TEST CIRCUIT

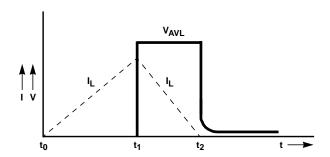


FIGURE 10. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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