

## 8A, 400V - 600V Ultrafast Diodes

The RURD840, RURD860, RURD840S and RURD860S are ultrafast dual diodes with soft recovery characteristics ( $t_{rr} < 60\text{ns}$ ). 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 TA09616.

### Ordering Information

PART NUMBER	PACKAGE	BRAND
RURD840	TO-251	RUR840
RURD860	TO-251	RUR860
RURD840S	TO-252	RUR840
RURD860S	TO-252	RUR860

NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-252 variant in tape and reel, e.g. RURD860S9A.

### Symbol



### Features

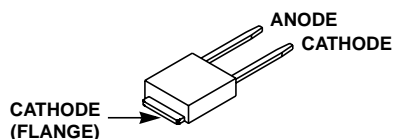
- Ultrafast with Soft Recovery . . . . . <60ns
- Operating Temperature . . . . . 175°C
- Reverse Voltage Up To . . . . . 600V
- Avalanche Energy Rated
- Planar Construction

### Applications

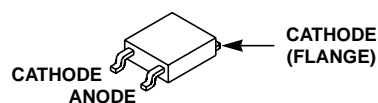
- Switching Power Supplies
- Power Switching Circuits
- General Purpose

### Packaging

JEDEC STYLE TO-251



JEDEC STYLE TO-252



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

	RURD840 RURD840S	RURD860 RURD860S	UNITS
Peak Repetitive Reverse Voltage . . . . . $V_{RRM}$	400	600	V
Working Peak Reverse Voltage . . . . . $V_{RWM}$	400	600	V
DC Blocking Voltage . . . . . $V_R$	400	600	V
Average Rectified Forward Current . . . . . $I_{F(AV)}$ ( $T_C = 155^\circ\text{C}$ )	8	8	A
Repetitive Peak Surge Current . . . . . $I_{FRM}$ (Square Wave, 20kHz)	16	16	A
Nonrepetitive Peak Surge Current . . . . . $I_{FSM}$ (Halfwave, 1 Phase, 60Hz)	40	40	A
Maximum Power Dissipation . . . . . $P_D$	75	75	W
Avalanche Energy (See Figures 10 and 11) . . . . . $E_{AVL}$	20	20	mJ
Operating and Storage Temperature . . . . . $T_{STG}, T_J$	-65 to 175	-65 to 175	°C
Maximum Lead Temperature for Soldering			
Leads at 0.063in (1.6mm) from Case for 10s. . . . . $T_L$	300	300	°C
Package Body for 10s, See Tech Brief 334 . . . . . $T_{PKG}$	260	260	°C

# RURD840, RURD860, RURD840S, RURD860S

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

SYMBOL	TEST CONDITION	RURD840, RURD840S			RURD860, RURD860S			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
$V_F$	$I_F = 8\text{A}$	-	-	1.5	-	-	1.5	V
	$I_F = 8\text{A}, T_C = 150^\circ\text{C}$	-	-	1.3	-	-	1.3	V
$I_R$	$V_R = 400\text{V}$	-	-	100	-	-	-	$\mu\text{A}$
	$V_R = 600\text{V}$	-	-	-	-	-	100	$\mu\text{A}$
	$V_R = 400\text{V}, T_C = 150^\circ\text{C}$	-	-	500	-	-	-	$\mu\text{A}$
	$V_R = 600\text{V}, T_C = 150^\circ\text{C}$	-	-	-	-	-	500	$\mu\text{A}$
$t_{rr}$	$I_F = 1\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	-	60	-	-	60	ns
	$I_F = 8\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	-	70	-	-	70	ns
$t_a$	$I_F = 8\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	32	-	-	32	-	ns
$t_b$	$I_F = 8\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	21	-	-	21	-	ns
$Q_{RR}$	$I_F = 8\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}$	-	195	-	-	195	-	nC
$C_J$	$V_R = 10\text{V}, I_F = 0\text{A}$	-	25	-	-	25	-	pF
$R_{\theta JC}$		-	-	2	-	-	2	$^\circ\text{C}/\text{W}$

### DEFINITIONS

$V_F$  = Instantaneous forward voltage ( $p_w = 300\mu\text{s}$ ,  $D = 2\%$ ).

$I_R$  = 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.

$p_w$  = pulse width.

$D$  = duty cycle.

## Typical Performance Curves

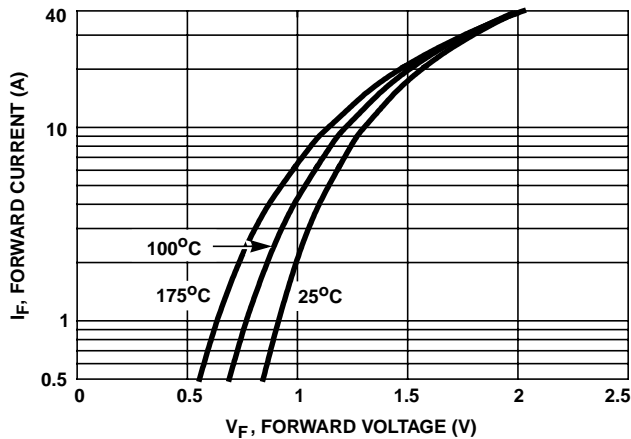


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

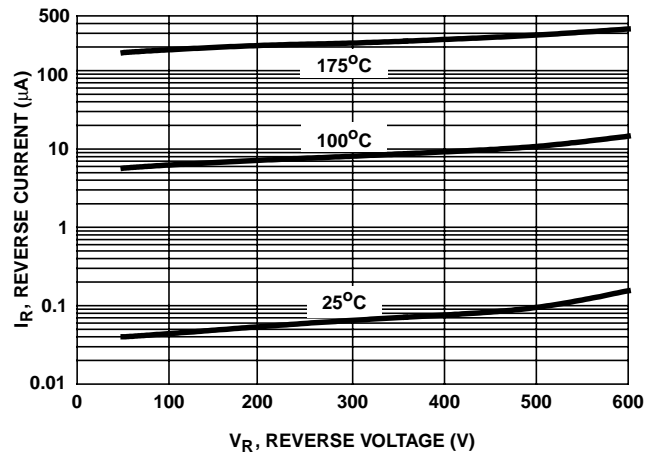


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

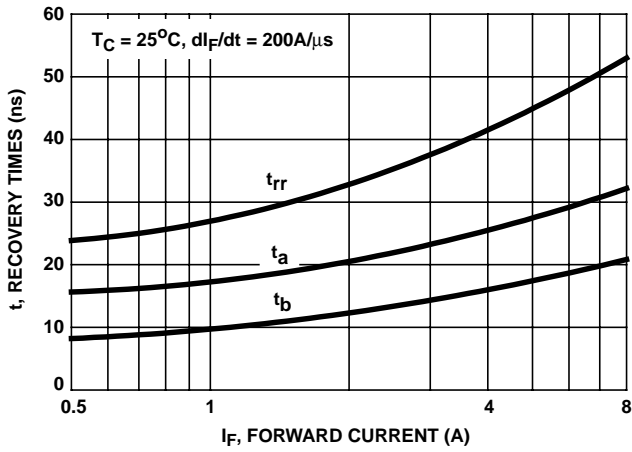


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

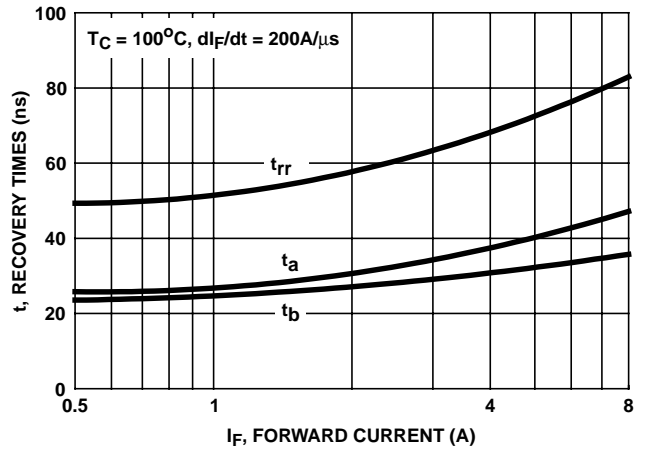


FIGURE 4.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

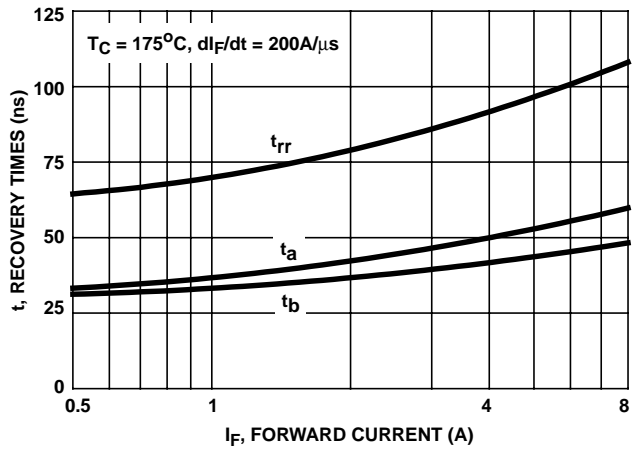


FIGURE 5.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

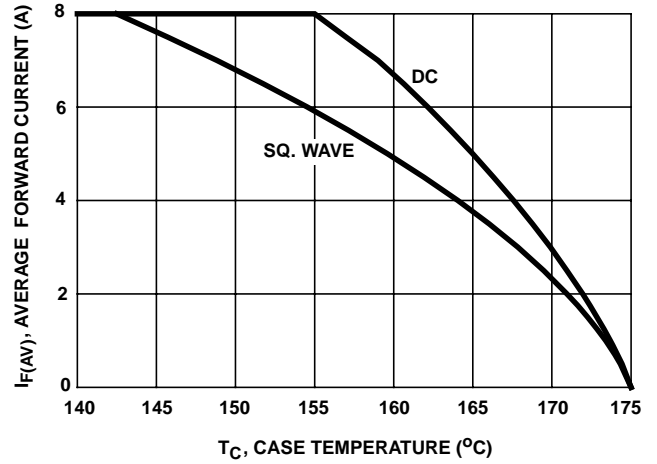


FIGURE 6. CURRENT DERATING CURVE

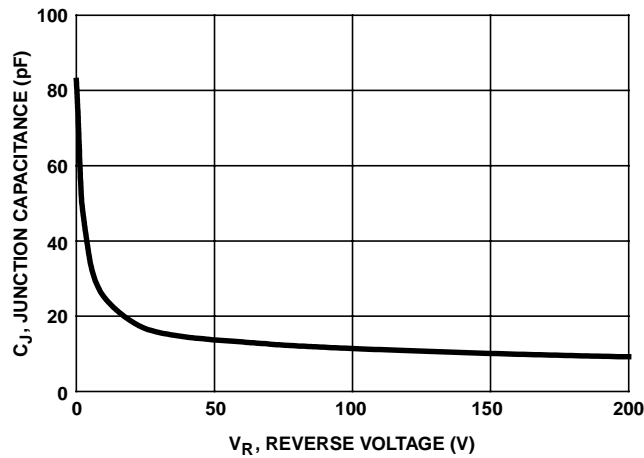


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms



FIGURE 8.  $t_{rr}$  TEST CIRCUIT

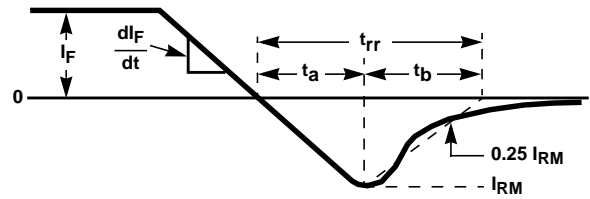


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

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



FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT



FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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