

April 1995

80A, 400V - 600V Ultrafast Diodes

## Features

- Ultrafast with Soft Recovery.....<75ns
- Operating Temperature .....+175°C
- Reverse Voltage Up To .....600V
- Avalanche Energy Rated
- Planar Construction

## Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

## Description

RURU8040, RURU8050 and RURU8060 (TA9886) are ultrafast diodes with soft recovery characteristics ( $t_{RR} < 75ns$ ). 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 recovery with soft recovery characteristic minimizes ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

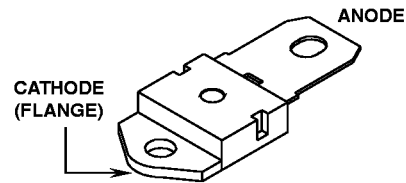
### PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURU8040	TO-218	RURU8040
RURU8050	TO-218	RURU8050
RURU8060	TO-218	RURU8060

NOTE: When ordering, use the entire part number.

## Package

JEDEC STYLE SINGLE LEAD TO-218



## Symbol



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

	RURU8040	RURU8050	RURU8060	UNITS
Peak Repetitive Reverse Voltage..... $V_{RRM}$	400	500	600	V
Working Peak Reverse Voltage..... $V_{RWM}$	400	500	600	V
DC Blocking Voltage..... $V_R$	400	500	600	V
Average Rectified Forward Current..... $I_{F(AV)}$ ( $T_C = +84^\circ C$ )	80	80	80	A
Repetitive Peak Surge Current..... $I_{FSM}$ (Square Wave, 20kHz)	160	160	160	A
Nonrepetitive Peak Surge Current..... $I_{FSM}$ (Halfwave, 1 Phase, 60Hz)	800	800	800	A
Maximum Power Dissipation..... $P_D$	180	180	180	W
Avalanche Energy ( $L = 40mH$ )..... $E_{AVL}$	50	50	50	mj
Operating and Storage Temperature..... $T_{STG}, T_J$	-65 to +175	-65 to +175	-65 to +175	$^\circ C$

# Specifications RURU8040, RURU8050, RURU8060

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

SYMBOL	TEST CONDITION	LIMITS									UNITS
		RURU8040			RURU8050			RURU8060			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
$V_F$	$I_F = 80\text{A}$ , $T_C = +25^\circ\text{C}$	-	-	1.6	-	-	1.6	-	-	1.6	V
$V_F$	$I_F = 80\text{A}$ , $T_C = +150^\circ\text{C}$	-	-	1.4	-	-	1.4	-	-	1.4	V
$I_R$	$V_R = 400\text{V}$ , $T_C = +25^\circ\text{C}$	-	-	500	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 500\text{V}$ , $T_C = +25^\circ\text{C}$	-	-	-	-	-	500	-	-	-	$\mu\text{A}$
	$V_R = 600\text{V}$ , $T_C = +25^\circ\text{C}$	-	-	-	-	-	-	-	-	500	$\mu\text{A}$
$I_R$	$V_R = 400\text{V}$ , $T_C = +150^\circ\text{C}$	-	-	2.0	-	-	-	-	-	-	mA
	$V_R = 500\text{V}$ , $T_C = +150^\circ\text{C}$	-	-	-	-	-	2.0	-	-	-	mA
	$V_R = 600\text{V}$ , $T_C = +150^\circ\text{C}$	-	-	-	-	-	-	-	-	2.0	mA
$t_{RR}$	$I_F = 1\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	75	-	-	75	-	-	75	ns
	$I_F = 80\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	85	-	-	85	-	-	85	ns
$t_A$	$I_F = 80\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$	-	40	-	-	40	-	-	40	-	ns
$t_B$	$I_F = 80\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$	-	25	-	-	25	-	-	25	-	ns
$R_{\theta JC}$		-	-	0.83	-	-	0.83	-	-	0.83	$^\circ\text{C}/\text{W}$

### 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 2), summation of  $t_A + t_B$ .

$t_A$  = Time to reach peak reverse current (See Figure 2).

$t_B$  = 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 2).

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

$E_{AVL}$  = Controlled avalanche energy (See Figures 7 and 8).

pw = pulse width.

D = duty cycle.

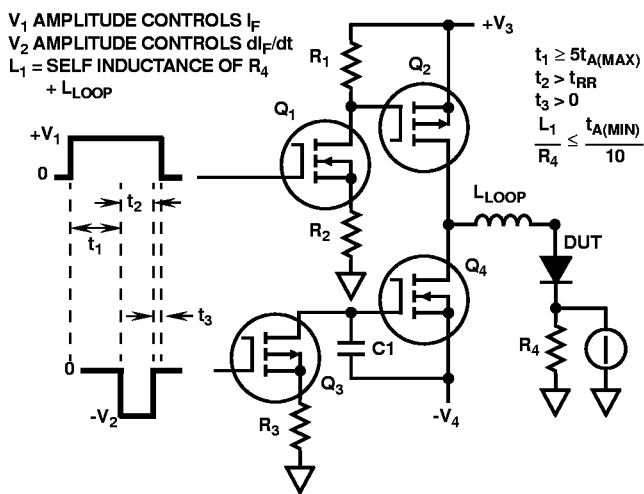


FIGURE 1.  $t_{RR}$  TEST CIRCUIT

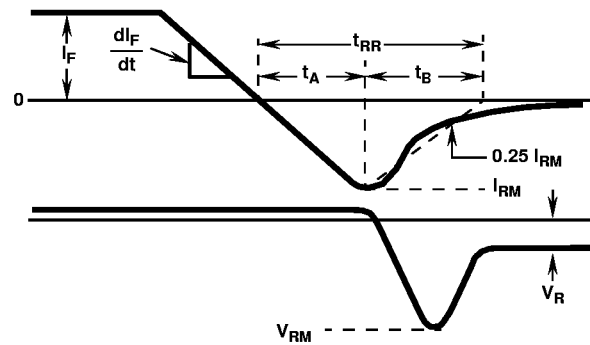


FIGURE 2.  $t_{RR}$  WAVEFORMS AND DEFINITIONS

Typical Performance Curves

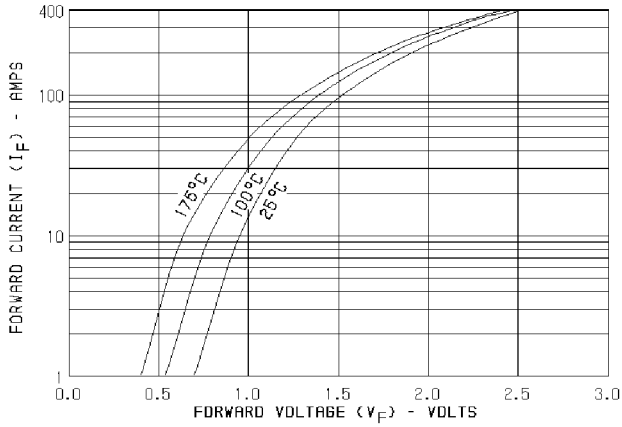


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

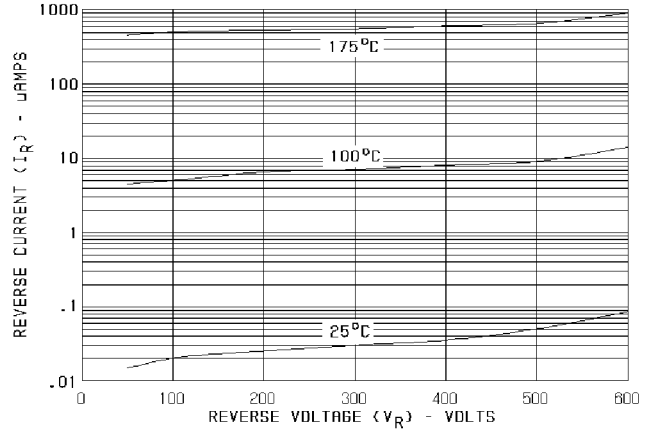


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

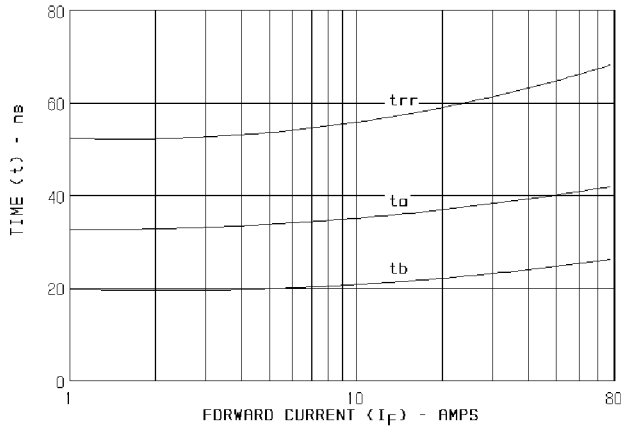


FIGURE 5. TYPICAL  $t_{RRr}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT

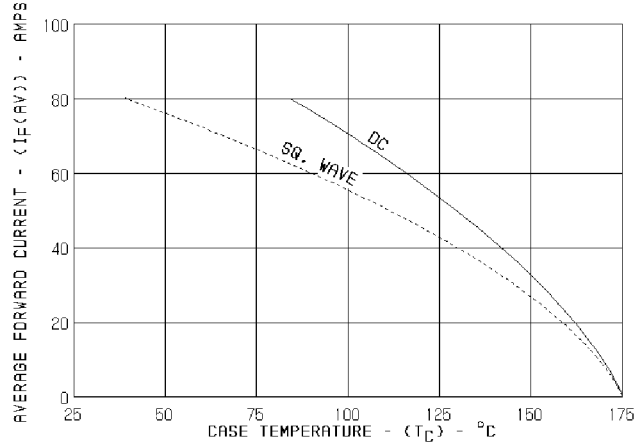


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

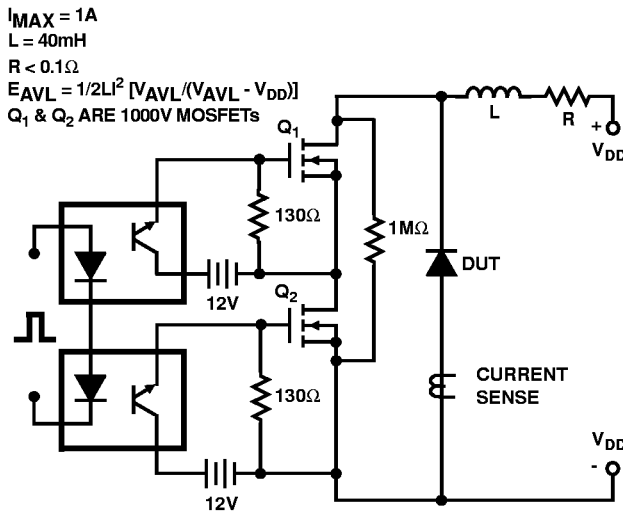


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

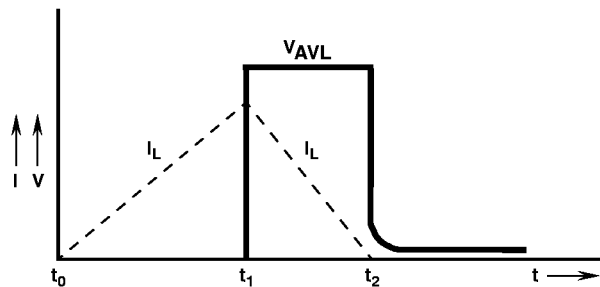


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS