

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

RURG8040, RURG8050 and RURG8060 (TA9886) are ultrafast diodes with soft recovery characteristics ( $t_{RR} < 75\text{ns}$ ). 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 recovery with soft recovery characteristic minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

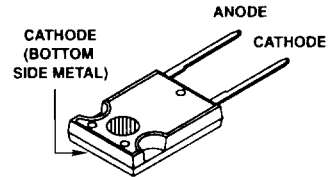
#### PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURG8040	TO-247	RURG8040
RURG8050	TO-247	RURG8050
RURG8060	TO-247	RURG8060

NOTE: When ordering, use the entire part number.

### Package

JEDEC STYLE 2 LEAD TO-247



### Symbol



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

	RURG8040	RURG8050	RURG8060	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 ..... $I_{F(AV)}$ ( $T_C = +72^\circ\text{C}$ )	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 ( $L = 40\text{mH}$ ) ..... $E_{AVL}$	50	50	50	mj
Operating and Storage Temperature ..... $T_{STG}, T_J$	-65 to +175	-65 to +175	-65 to +175	°C

## Specifications RURG8040, RURG8050, RURG8060

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

SYMBOL	TEST CONDITION	LIMITS									UNITS
		RURG8040			RURG8050			RURG8060			
		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.

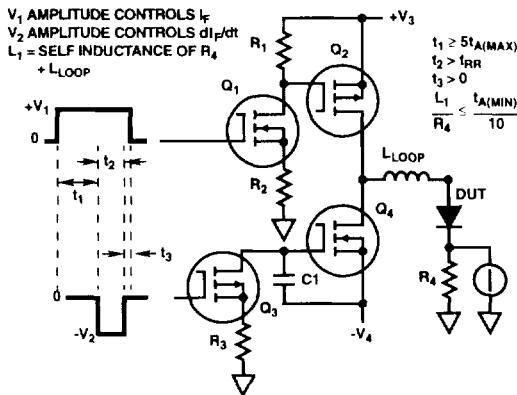


FIGURE 1.  $t_{RR}$  TEST CIRCUIT

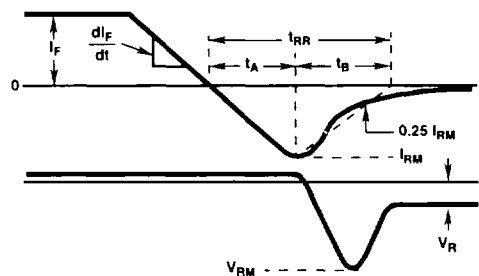


FIGURE 2.  $t_{RR}$  WAVEFORMS AND DEFINITIONS

Typical Performance Curves

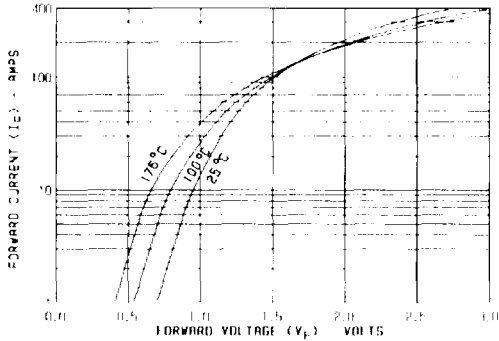


FIGURE 3. TYPICAL FORWARD CURRENT vs. FORWARD VOLTAGE DROP

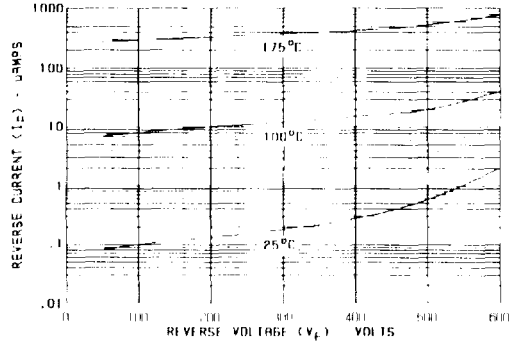


FIGURE 4. TYPICAL REVERSE CURRENT vs. VOLTAGE

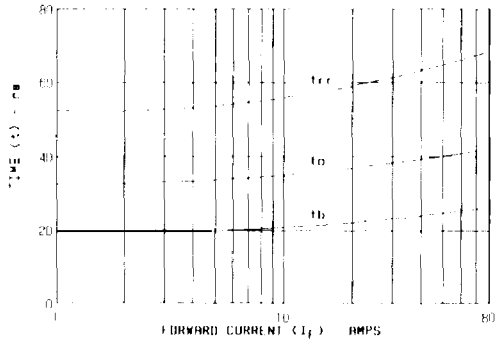


FIGURE 5. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs. FORWARD CURRENT

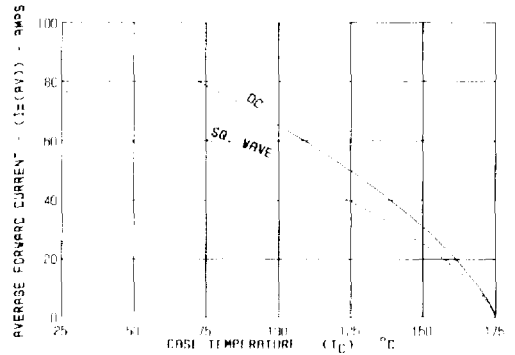


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

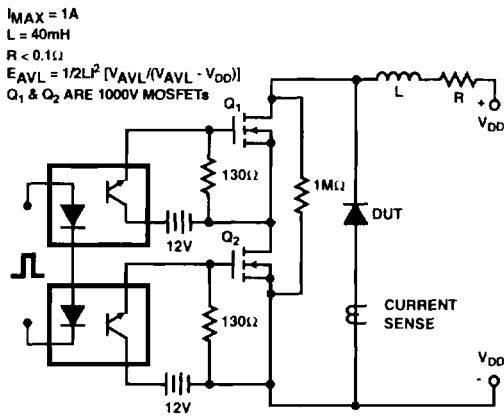


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

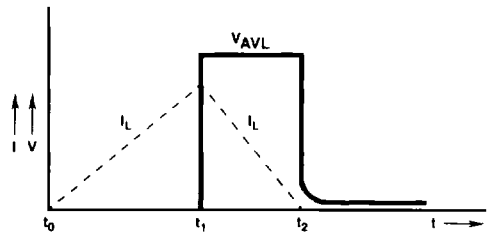


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS