

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.

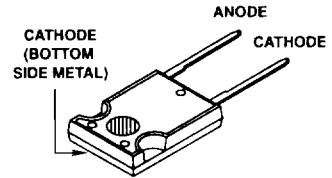
PACKAGING AVAILABILITY

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	-	-	-	-	-	-	μA
	$V_R = 500\text{V}$, $T_C = +25^\circ\text{C}$	-	-	-	-	-	500	-	-	-	μA
	$V_R = 600\text{V}$, $T_C = +25^\circ\text{C}$	-	-	-	-	-	-	-	-	500	μA
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 μs , 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.

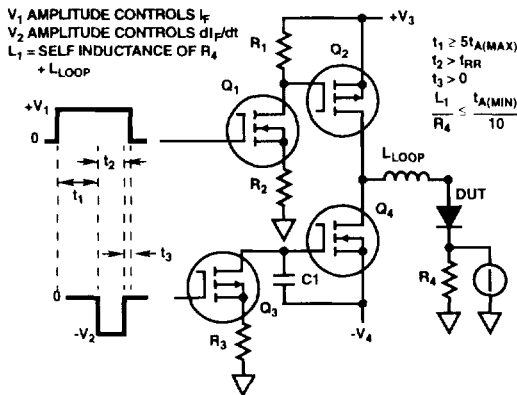


FIGURE 1. t_{RR} TEST CIRCUIT

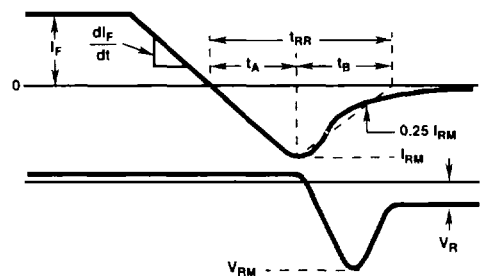


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

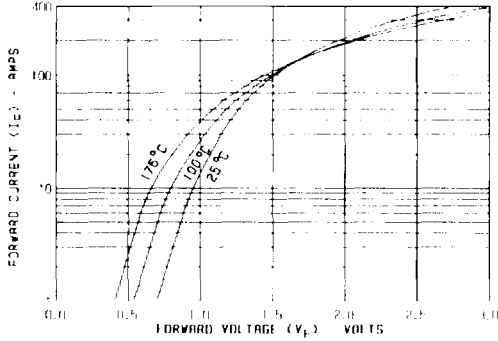


FIGURE 3. TYPICAL FORWARD CURRENT vs. FORWARD VOLTAGE DROP

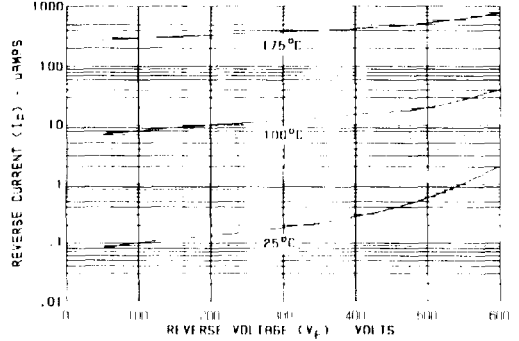


FIGURE 4. TYPICAL REVERSE CURRENT vs. VOLTAGE

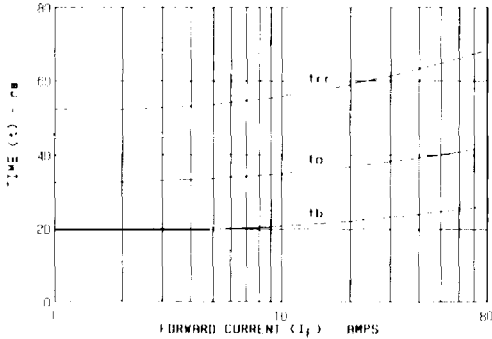


FIGURE 5. TYPICAL t_{RR} , t_A AND t_B CURVES vs. FORWARD CURRENT

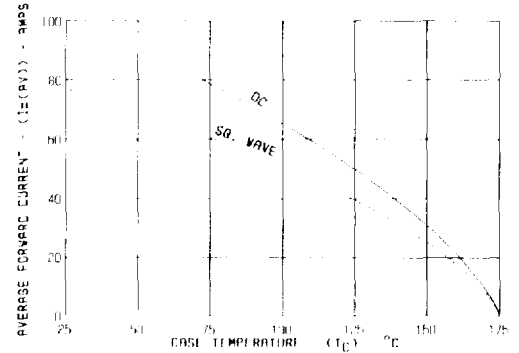


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

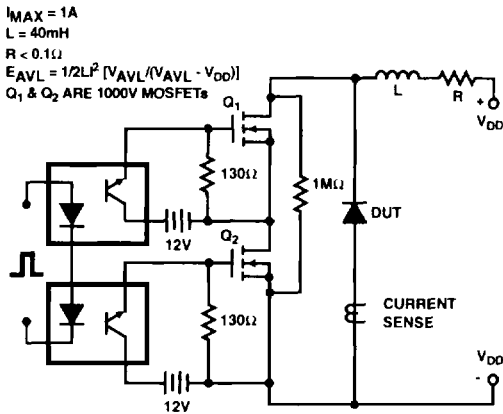


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

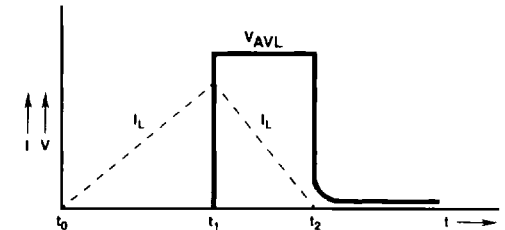


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS