

April 1995

50A, 700V - 1000V Ultrafast Diodes

Features

- Ultrafast with Soft Recovery <125ns
- Operating Temperature +175°C
- Reverse Voltage Up To 1000V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Description

RURG5070, RURG5080, RURG5090 and RURG50100 are ultrafast diodes with soft recovery characteristics ($t_{RR} < 125\text{ns}$). They have low forward voltage drop and are silicon nitride passivated ion-implanted epitaxial planar construction.

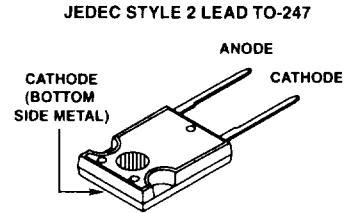
These devices are intended for use as freewheeling/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast recovery with soft recovery characteristic minimizes ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURG5070	TO-247	RURG5070
RURG5080	TO-247	RURG5080
RURG5090	TO-247	RURG5090
RURG50100	TO-247	RURG50100

NOTE: When ordering, use the entire part number.

Package



Symbol



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

	RURG5070	RURG5080	RURG5090	RURG50100	UNITS
Peak Repetitive Reverse Voltage V_{RRM}	700	800	900	1000	V
Working Peak Reverse Voltage V_{RWM}	700	800	900	1000	V
DC Blocking Voltage V_R	700	800	900	1000	V
Average Rectified Forward Current $I_{F(AV)}$ ($T_C = +85^\circ\text{C}$)	50	50	50	50	A
Repetitive Peak Surge Current I_{FSM} (Square Wave, 20kHz)	100	100	100	100	A
Nonrepetitive Peak Surge Current I_{FSM} (Halfwave, 1 Phase, 60Hz)	500	500	500	500	A
Maximum Power Dissipation P_D	150	150	150	150	W
Avalanche Energy E_{AVL}	40	40	40	40	mJ
Operating and Storage Temperature T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	-65 to +175	$^\circ\text{C}$

Specifications RURG5070, RURG5080, RURG5090, RURG50100

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

SYMBOL	TEST CONDITION	LIMITS												UNITS
		RURG5070			RURG5080			RURG5090			RURG50100			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 50\text{A}, T_C = +25^\circ\text{C}$	-	-	1.9	-	-	1.9	-	-	1.9	-	-	1.9	V
V_F	$I_F = 50\text{A}, T_C = +150^\circ\text{C}$	-	-	1.7	-	-	1.7	-	-	1.7	-	-	1.7	V
I_R	$V_R = 700\text{V}, T_C = +25^\circ\text{C}$	-	-	500	-	-	-	-	-	-	-	-	-	μA
	$V_R = 800\text{V}, T_C = +25^\circ\text{C}$	-	-	-	-	-	500	-	-	-	-	-	-	μA
	$V_R = 900\text{V}, T_C = +25^\circ\text{C}$	-	-	-	-	-	-	-	-	500	-	-	-	μA
	$V_R = 1000\text{V}, T_C = +25^\circ\text{C}$	-	-	-	-	-	-	-	-	-	-	-	500	μA
I_R	$V_R = 700\text{V}, T_C = +150^\circ\text{C}$	-	-	1.5	-	-	-	-	-	-	-	-	-	mA
	$V_R = 800\text{V}, T_C = +150^\circ\text{C}$	-	-	-	-	-	1.5	-	-	-	-	-	-	mA
	$V_R = 900\text{V}, T_C = +150^\circ\text{C}$	-	-	-	-	-	-	-	-	1.5	-	-	-	mA
	$V_R = 1000\text{V}, T_C = +150^\circ\text{C}$	-	-	-	-	-	-	-	-	-	-	-	1.5	mA
t_{RR}	$I_F = 1\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	-	125	-	-	125	-	-	125	-	-	125	ns
	$I_F = 50\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	-	200	-	-	200	-	-	200	-	-	200	ns
t_A	$I_F = 50\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	110	-	-	110	-	-	110	-	-	110	-	ns
t_B	$I_F = 50\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	65	-	-	65	-	-	65	-	-	65	-	ns
$R_{\theta JC}$		-	-	1.0	-	-	1.0	-	-	1.0	-	-	1.0	$^\circ\text{C}/\text{W}$

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 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).

p_w = pulse width.

D = duty cycle.

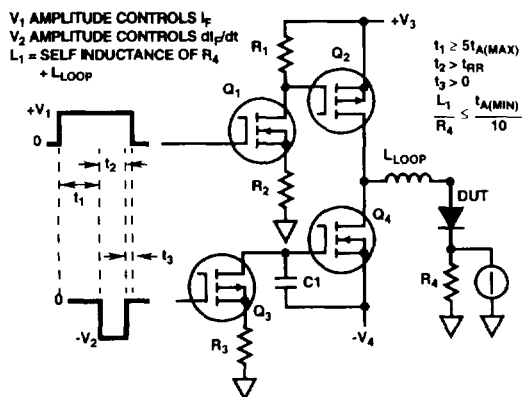


FIGURE 1. t_{RR} TEST CIRCUIT

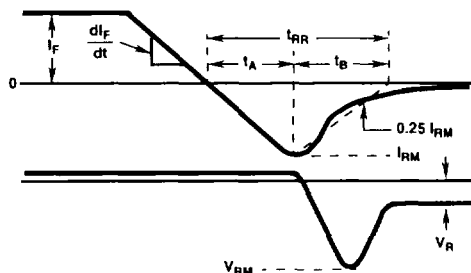


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

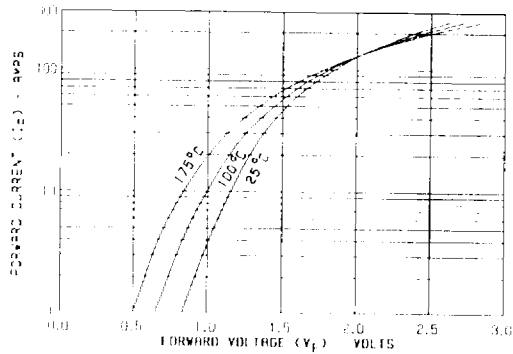


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

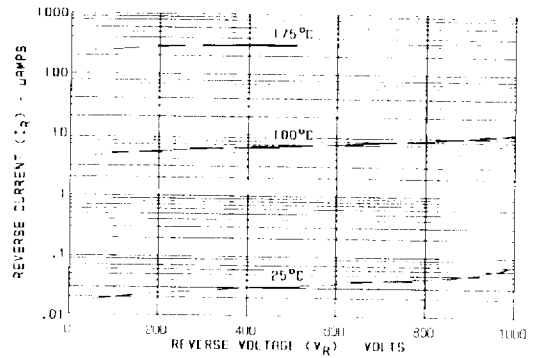


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

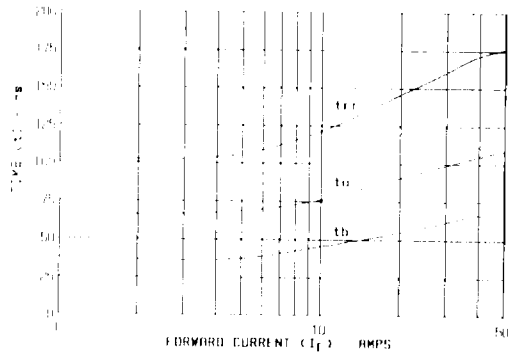


FIGURE 5. TYPICAL t_{RR} , t_A AND t_B CURVES vs FORWARD CURRENT

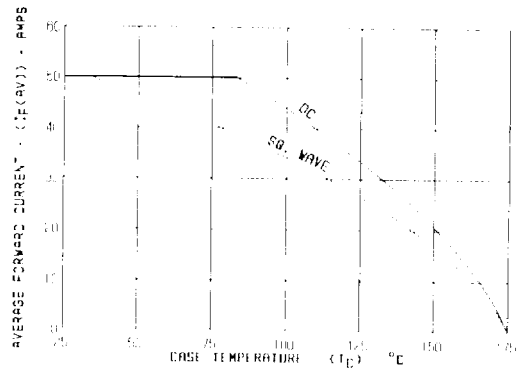


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

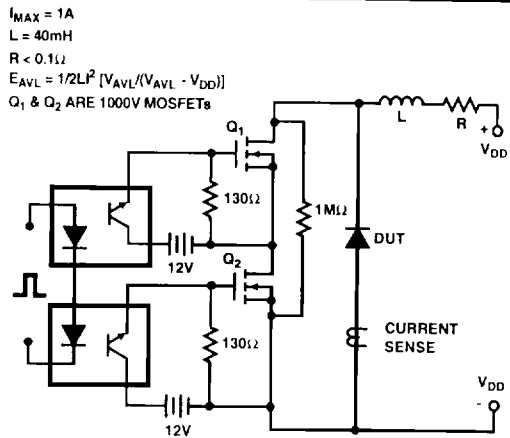


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

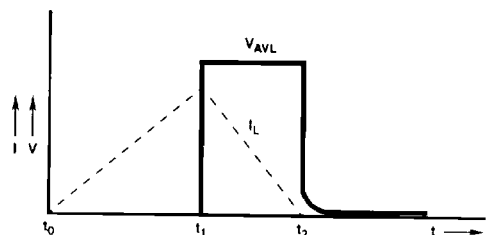


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS