

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

RURU5070, RURU5080, RURU5090 and RURU50100 (TA9910) 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 minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

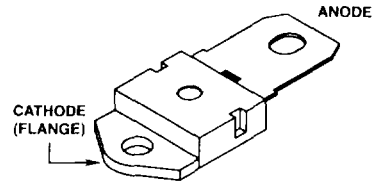
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURU5070	TO-218	RURU5070
RURU5080	TO-218	RURU5080
RURU5090	TO-218	RURU5090
RURU50100	TO-218	RURU50100

NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE SINGLE LEAD TO-218



Symbol



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

	RURU5070	RURU5080	RURU5090	RURU50100	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 $I_{F(AV)}$ ($T_C = +88.6^\circ\text{C}$)	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 ($L = 40\text{mH}$) 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 RURU5070, RURU5080, RURU5090, RURU50100

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

SYMBOL	TEST CONDITION	LIMITS												UNITS
		RURU5070			RURU5080			RURU5090			RURU50100			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 50\text{A}$	-	-	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	$V_R = 700\text{V}$	-	-	500	-	-	-	-	-	-	-	-	-	μA
	$V_R = 800\text{V}$	-	-	-	-	-	500	-	-	-	-	-	-	μA
	$V_R = 900\text{V}$	-	-	-	-	-	-	-	-	500	-	-	-	μA
	$V_R = 1000\text{V}$	-	-	-	-	-	-	-	-	-	-	-	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.

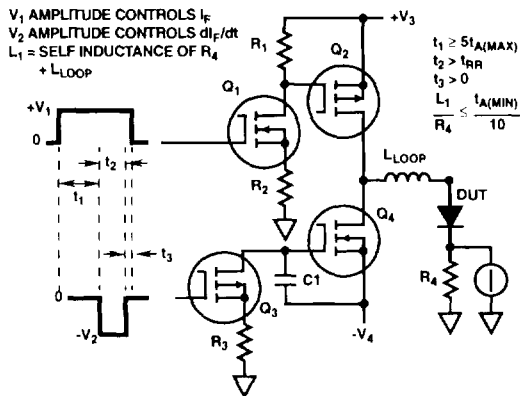


FIGURE 1. t_{RR} TEST CIRCUIT

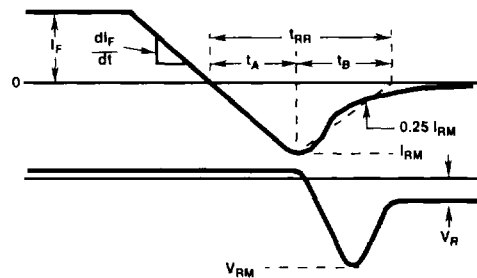


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

51
ULTRAFAST
SINGLE DIODES

Typical Performance Curves

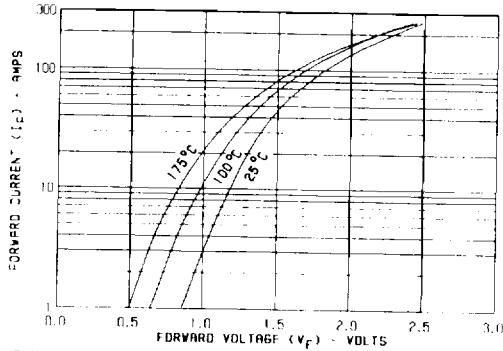


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

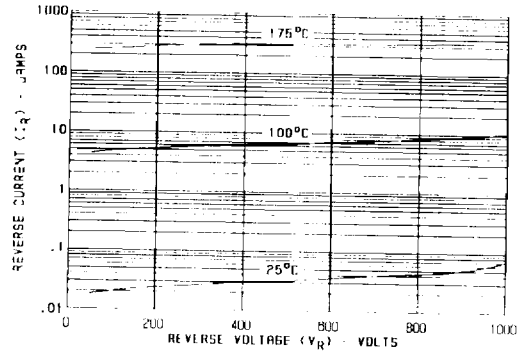


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

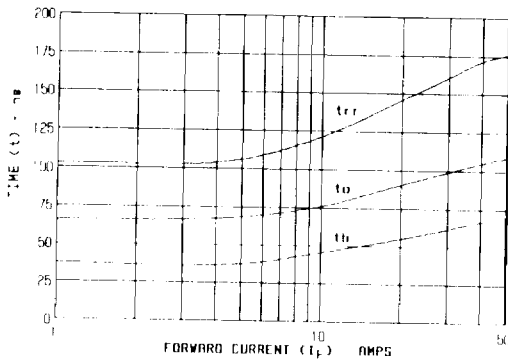


FIGURE 5. TYPICAL t_{RR} , t_A AND t_B CURVES vs FORWARD CURRENT

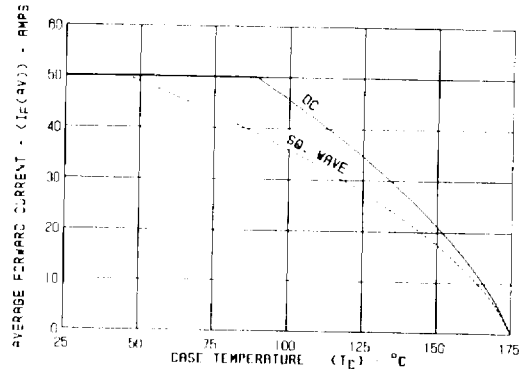


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

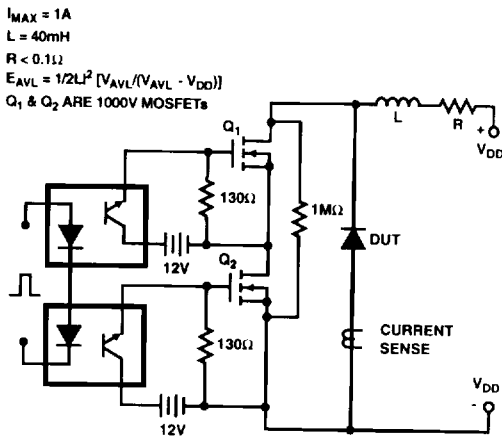


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

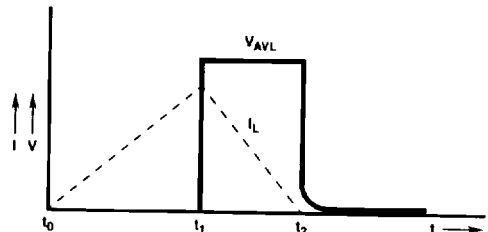


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS