

April 1995

100A, 400V - 600V Ultrafast Diodes

Features

- Ultrafast with Soft Recovery <80ns
- Operating Temperature +175°C
- Reverse Voltage Up to 600V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Description

RURU10040, RURU10050 and RURU10060 (TA49019) are ultrafast diodes with soft recovery characteristics ($t_{RR} < 80ns$). 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.

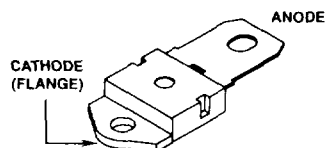
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURU10040	TO-218	RURU10040
RURU10050	TO-218	RURU10050
RURU10060	TO-218	RURU10060

NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE SINGLE LEAD TO-218



Symbol



Absolute Maximum Ratings $T_C = +25^\circ C$

	RURU10040	RURU10050	RURU10060	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 $I_{F(AV)}$ ($T_C = +68.2^\circ C$)	100	100	100	A
Repetitive Peak Surge Current I_{FSM} (Square Wave, 20kHz)	200	200	200	A
Nonrepetitive Peak Surge Current I_{FSM} (Halfwave, 1 Phase, 60Hz)	1000	1000	1000	A
Maximum Power Dissipation P_D	210	210	210	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	°C

Specifications RURU10040, RURU10050, RURU10060

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

SYMBOL	TEST CONDITION	RURU10040 LIMITS			RURU10050 LIMITS			RURU10060 LIMITS			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 100\text{A}$	-	-	1.6	-	-	1.6	-	-	1.6	V
V_F	$I_F = 100\text{A}$ $T_C = +150^\circ\text{C}$	-	-	1.4	-	-	1.4	-	-	1.4	
I_R	$V_R = 400\text{V}$ $V_R = 500\text{V}$ $V_R = 600\text{V}$	-	-	500	-	-	-	-	-	-	μA
I_R	$V_R = 400\text{V}$ $V_R = 500\text{V}$ $V_R = 600\text{V}$	-	-	-	-	-	500	-	-	-	
I_R	$V_R = 400\text{V}$ $V_R = 500\text{V}$ $V_R = 600\text{V}$	-	-	-	-	-	-	-	-	500	
I_R	$V_R = 400\text{V}$ $V_R = 500\text{V}$ $V_R = 600\text{V}$ $T_C = +150^\circ\text{C}$	-	-	2.0	-	-	-	-	-	-	mA
I_R	$V_R = 400\text{V}$ $V_R = 500\text{V}$ $V_R = 600\text{V}$	-	-	-	-	-	2.0	-	-	-	
I_R	$V_R = 400\text{V}$ $V_R = 500\text{V}$ $V_R = 600\text{V}$	-	-	-	-	-	-	-	-	2.0	
t_{RR}	$I_F = 1\text{A}$, $di_F/dt = 100\text{A}/\mu\text{s}$	-	-	80	-	-	80	-	-	80	ns
t_{RR}	$I_F = 100\text{A}$, $di_F/dt = 100\text{A}/\mu\text{s}$	-	-	100	-	-	100	-	-	100	
t_A	$I_F = 100\text{A}$, $di_F/dt = 100\text{A}/\mu\text{s}$	-	45	-	-	45	-	-	45	-	
t_B	$I_F = 100\text{A}$, $di_F/dt = 100\text{A}/\mu\text{s}$	-	25	-	-	25	-	-	25	-	
$R_{\theta JC}$		-	-	0.71	-	-	0.71	-	-	0.71	$^\circ\text{C}/\text{W}$

DEFINITIONS

V_F = Instantaneous forward voltage ($p_w = 300\mu\text{s}$, $D = 2\%$).

I_R = Instantaneous reverse current.

t_{RR} = Reverse recovery time 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.

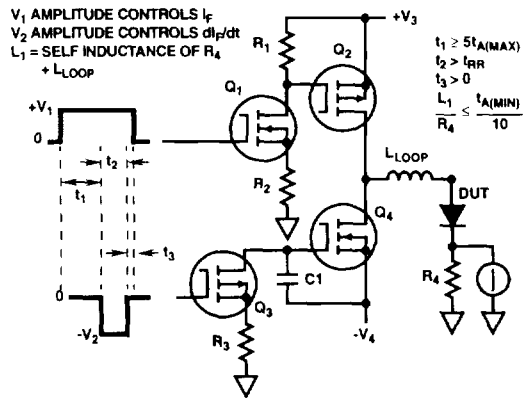


FIGURE 1. t_{RR} TEST CIRCUIT

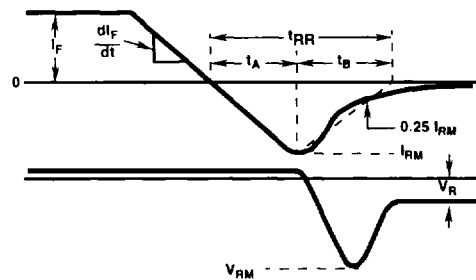


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

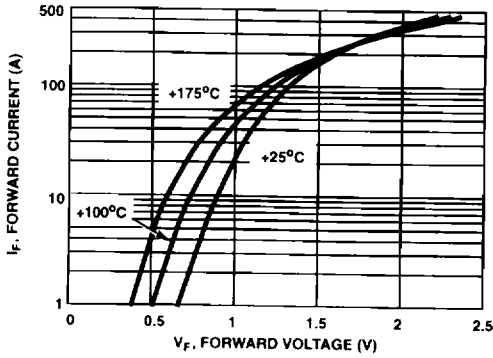


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

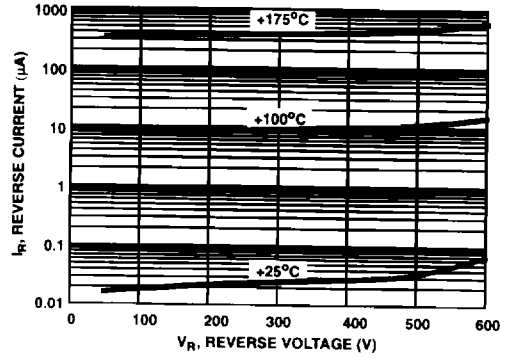


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

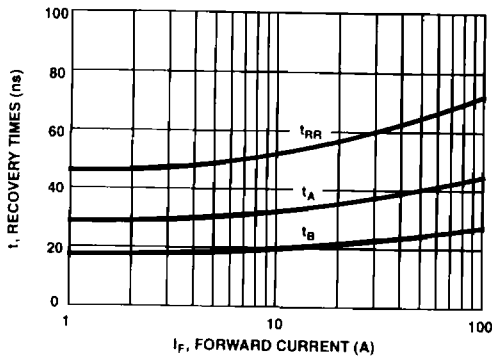


FIGURE 5. TYPICAL t_{RR} , t_A AND t_B CURVES vs FORWARD CURRENT

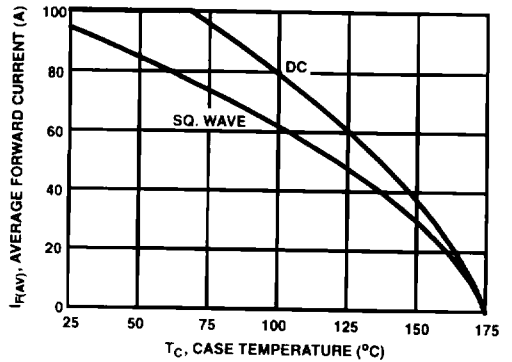


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

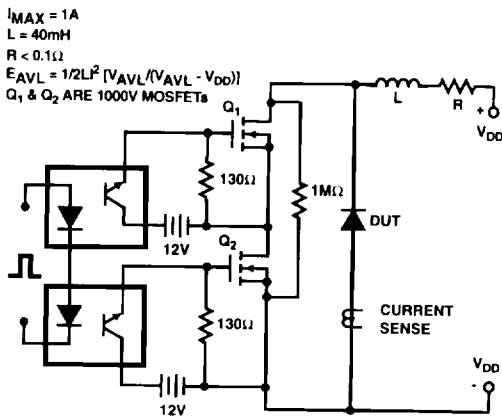


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

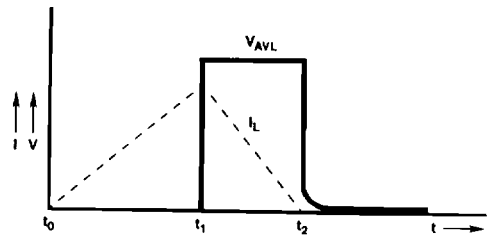


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS