

April 1995

30A, 400V - 600V Ultrafast Dual Diodes

Features

- Ultrafast with Soft Recovery <55ns
- Operating Temperature +175°C
- Reverse Voltage Up to 600V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Description

RURG3040CC, RURG3050CC and RURG3060CC (TA9903) are ultrafast dual diodes with soft recovery characteristics ($t_{RR} < 55\text{ns}$). They have low forward voltage drop and are silicon nitride passivated ion-implanted epitaxial planar construction.

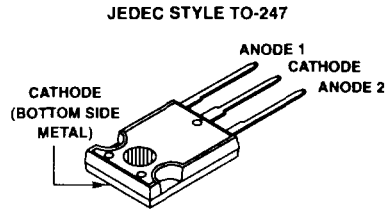
These devices are intended for use as freewheeling/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast recovery with soft recovery characteristic minimize ringing and electrical noise in many power switching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

PACKAGING AVAILABILITY

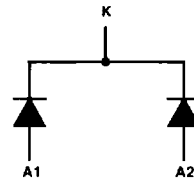
PART NUMBER	PACKAGE	BRAND
RURG3040CC	TO-247	RURG3040C
RURG3050CC	TO-247	RURG3050C
RURG3060CC	TO-247	RURG3060C

NOTE: When ordering, use the entire part number.

Package



Symbol



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

	RURG3040CC	RURG3050CC	RURG3060CC	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 (Per Leg) $I_{F(AV)}$ ($T_C = +130^\circ\text{C}$)	30	30	30	A
Repetitive Peak Surge Current..... I_{FSM} (Square Wave, 20kHz)	70	70	70	A
Nonrepetitive Peak Surge Current..... I_{FSM} (Halfwave, 1 Phase, 60Hz)	325	325	325	A
Maximum Power Dissipation..... P_D	125	125	125	W
Avalanche Energy..... E_{AVL} ($L = 40\text{mH}$)	20	20	20	mJ
Operating and Storage Temperature..... T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	$^\circ\text{C}$

Specifications RURG3040CC, RURG3050CC, RURG3060CC

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

SYMBOL	TEST CONDITION		RURG3040CC LIMITS			RURG3050CC LIMITS			RURG3060CC LIMITS			UNITS
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 30\text{A}$		-	-	1.5	-	-	1.5	-	-	1.5	V
V_F	$I_F = 30\text{A}$	$T_C = +150^\circ\text{C}$	-	-	1.3	-	-	1.3	-	-	1.3	V
I_R	$V_R = 400\text{V}$		-	-	500	-	-	-	-	-	-	μA
	$V_R = 500\text{V}$		-	-	-	-	-	500	-	-	-	μA
	$V_R = 600\text{V}$		-	-	-	-	-	-	-	-	500	μA
I_R	$V_R = 400\text{V}$	$T_C = +150^\circ\text{C}$	-	-	1.0	-	-	-	-	-	-	mA
	$V_R = 500\text{V}$	$T_C = +150^\circ\text{C}$	-	-	-	-	-	1.0	-	-	-	mA
	$V_R = 600\text{V}$	$T_C = +150^\circ\text{C}$	-	-	-	-	-	-	-	-	1.0	mA
t_{RR}	$I_F = 1\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$		-	-	55	-	-	55	-	-	55	ns
t_{RR}	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$		-	-	60	-	-	60	-	-	60	ns
t_A	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$		-	30	-	-	30	-	-	30	-	ns
t_B	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$		-	20	-	-	20	-	-	20	-	ns
$R_{\theta JC}$			-	-	1.2	-	-	1.2	-	-	1.2	$^\circ\text{C}/\text{W}$

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.

V_1 AMPLITUDE CONTROLS I_F
 V_2 AMPLITUDE CONTROLS dI_F/dt
 L_1 = SELF INDUCTANCE OF
 $R_4 + L_{\text{LOOP}}$

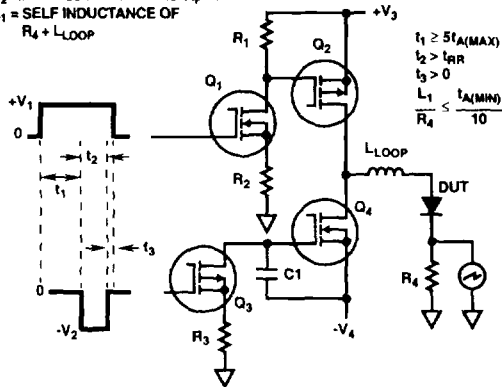


FIGURE 1. t_{RR} TEST CIRCUIT

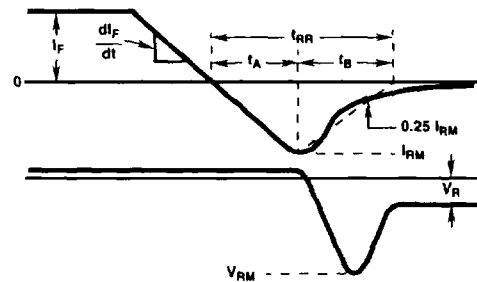


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

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ULTRAFAST
DUAL DIODES

Typical Performance Curves

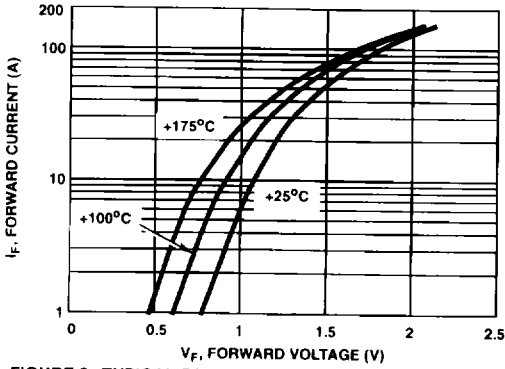


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

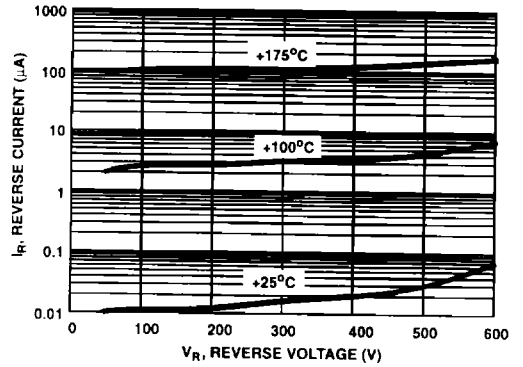


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

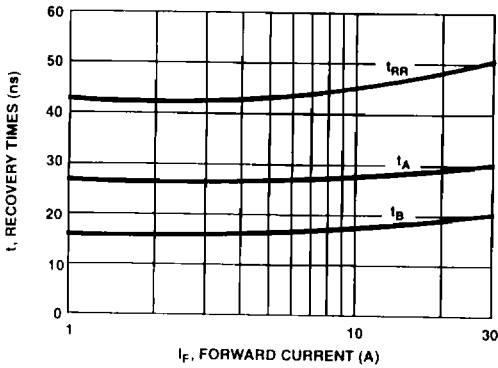


FIGURE 5. TYPICAL t_{RR} , t_A AND t_B CURVES vs FORWARD CURRENT

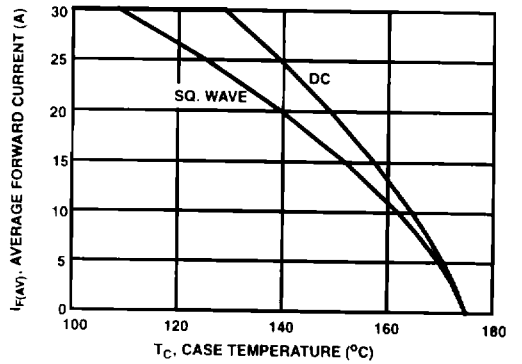


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

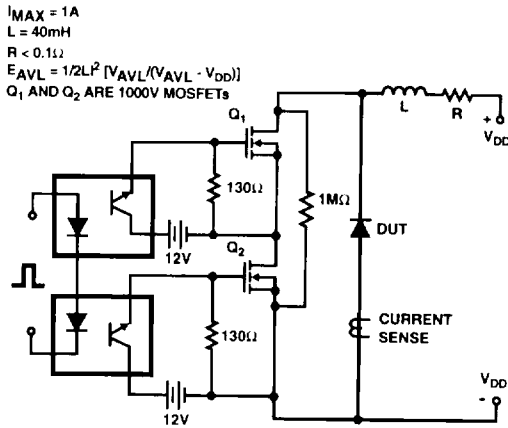


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

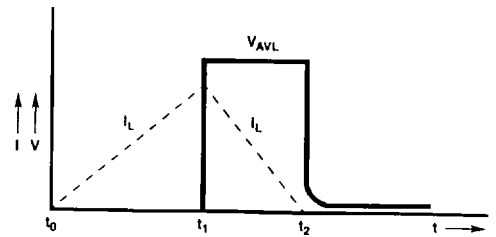


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS