

April 1995

30A, 100V - 200V Ultrafast Dual Diodes

**Features**

- Ultrafast with Soft Recovery ..... <45ns
- Operating Temperature ..... +175°C
- Reverse Voltage Up to ..... 200V
- Avalanche Energy Rated
- Planar Construction

**Applications**

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

**Description**

RURG3010CC, RURG3015CC and RURG3020CC (TA9645) are ultrafast dual diodes with soft recovery characteristics ( $t_{RR} < 45ns$ ). They have low forward voltage drop and are silicon nitride passivated ion-implanted epitaxial planar construction.

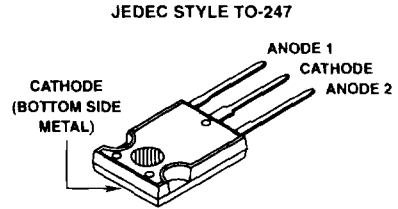
These devices are intended for use as freewheeling/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast recovery with soft recovery characteristic minimizes ringing and electrical noise in many power switching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

**PACKAGING AVAILABILITY**

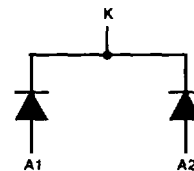
PART NUMBER	PACKAGE	BRAND
RURG3010CC	TO-247	RURG3010C
RURG3015CC	TO-247	RURG3015C
RURG3020CC	TO-247	RURG3020C

NOTE: When ordering, use the entire part number.

**Package**



**Symbol**



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

	RURG3010CC	RURG3015CC	RURG3020CC	UNITS
Peak Repetitive Reverse Voltage ..... $V_{RRM}$	100	150	200	V
Working Peak Reverse Voltage ..... $V_{RWM}$	100	150	200	V
DC Blocking Voltage ..... $V_R$	100	150	200	V
Average Rectified Forward Current (Per Leg) ..... $I_{F(AV)}$ ( $T_C = +145^\circ C$ )	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 ..... $E_{AVL}$ ( $L = 40mH$ )	20	20	20	mJ
Operating and Storage Temperature ..... $T_{STG}, T_J$	-65 to +175	-65 to +175	-65 to +175	°C

## Specifications RURG3010CC, RURG3015CC, RURG3020CC

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

SYMBOL	TEST CONDITION	RURG3010CC LIMITS			RURG3015CC LIMITS			RURG3020CC LIMITS			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
$V_F$	$I_F = 30\text{A}$	-	-	1.0	-	-	1.0	-	-	1.0	V
$V_F$	$I_F = 30\text{A}$ , $T_C = +150^\circ\text{C}$	-	-	0.85	-	-	0.85	-	-	0.85	V
$I_R$	$V_R = 100\text{V}$	-	-	500	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 150\text{V}$	-	-	-	-	-	500	-	-	-	$\mu\text{A}$
	$V_R = 200\text{V}$	-	-	-	-	-	-	-	-	500	$\mu\text{A}$
$I_R$	$V_R = 100\text{V}$ , $T_C = +150^\circ\text{C}$	-	-	100	-	-	-	-	-	-	mA
	$V_R = 150\text{V}$ , $T_C = +150^\circ\text{C}$	-	-	-	-	-	100	-	-	-	mA
	$V_R = 200\text{V}$ , $T_C = +150^\circ\text{C}$	-	-	-	-	-	-	-	-	1	mA
$t_{RR}$	$I_F = 1\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	45	-	-	45	-	-	45	ns
$t_{RR}$	$I_F = 30\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	50	-	-	50	-	-	50	ns
$t_A$	$I_F = 30\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$	-	20	-	-	20	-	-	20	-	ns
$t_B$	$I_F = 30\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$	-	15	-	-	15	-	-	15	-	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  
 $R_4 + L_{\text{LOOP}}$

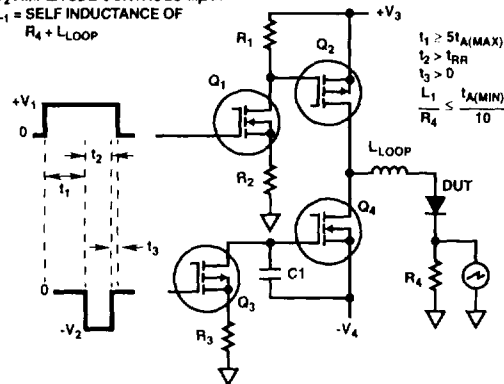


FIGURE 1.  $t_{RR}$  TEST CIRCUIT

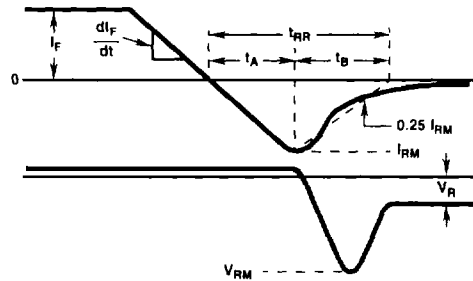


FIGURE 2.  $t_{RR}$  WAVEFORMS AND DEFINITIONS

Typical Performance Curves

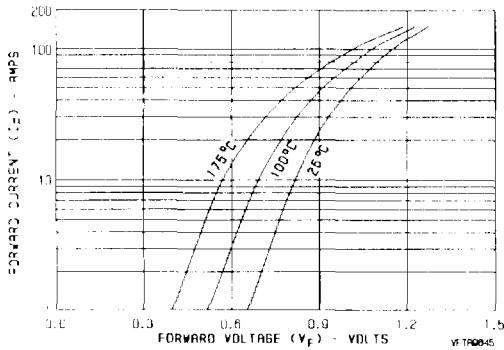


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

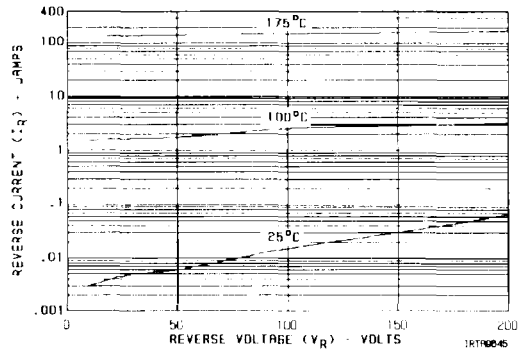


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

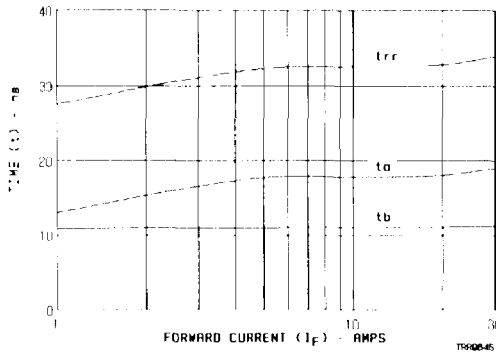


FIGURE 5. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT

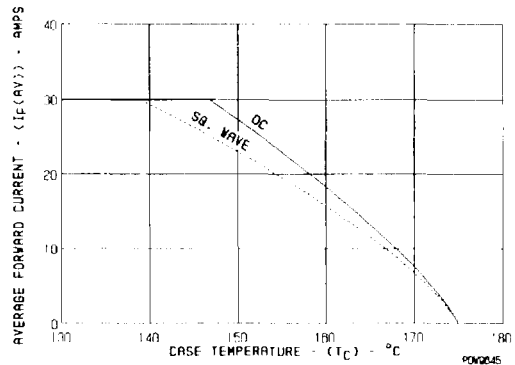


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

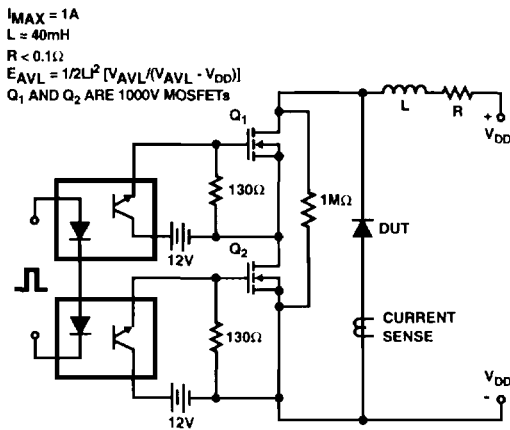


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

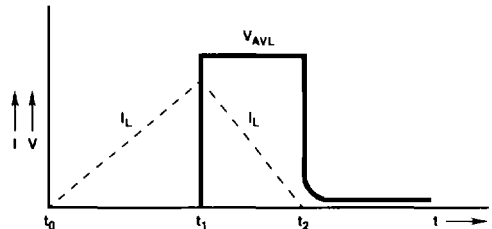


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS