

April 1995

30A, 100V - 200V Ultrafast 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

RURG3010, RURG3015 and RURG3020 are ultrafast diodes with soft recovery characteristics ($t_{RR} < 45ns$). They have low forward voltage drop and are silicon nitride passivated ion-implanted epitaxial planar construction.

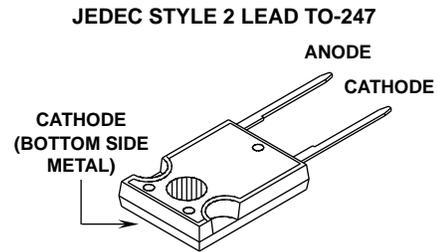
These devices are intended for use as freewheeling/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast recovery with soft recovery characteristic minimizes ringing and electrical noise in many power switching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

PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURG3010	TO-247	RURG3010
RURG3015	TO-247	RURG3015
RURG3020	TO-247	RURG3020

NOTE: When ordering, use the entire part number.

Package



Symbol



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

	RURG3010	RURG3015	RURG3020	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 $I_{F(AV)}$ ($T_C = +145^\circ C$)	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 (L = 40mH) E_{AVL}	20	20	20	mj
Operating and Storage Temperature T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	°C

Specifications RURG3010, RURG3015, RURG3020

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

SYMBOL	TEST CONDITION	LIMITS									UNITS
		RURG3010			RURG3015			RURG3020			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 30\text{A}, T_C = +25^\circ\text{C}$	-	-	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	$V_R = 100\text{V}, T_C = +25^\circ\text{C}$	-	-	500	-	-	-	-	-	-	μA
	$V_R = 150\text{V}, T_C = +25^\circ\text{C}$	-	-	-	-	-	500	-	-	-	μA
	$V_R = 200\text{V}, T_C = +25^\circ\text{C}$	-	-	-	-	-	-	-	-	500	μA
I_R	$V_R = 100\text{V}, T_C = +150^\circ\text{C}$	-	-	500	-	-	-	-	-	-	μA
	$V_R = 150\text{V}, T_C = +150^\circ\text{C}$	-	-	-	-	-	500	-	-	-	μA
	$V_R = 200\text{V}, T_C = +150^\circ\text{C}$	-	-	-	-	-	-	-	-	500	μA
t_{RR}	$I_F = 1\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	45	-	-	45	-	-	45	ns
	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	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 (pw = 300 μs , 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).

pw = pulse width.

D = duty cycle.

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

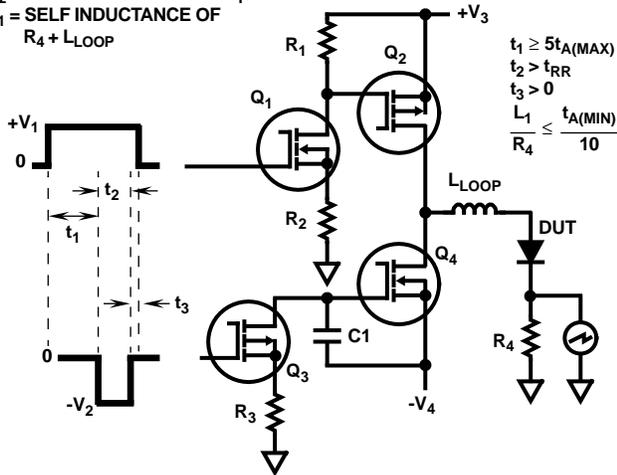


FIGURE 1. t_{RR} TEST CIRCUIT

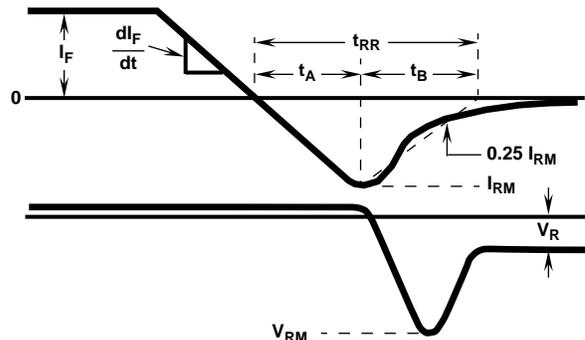


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

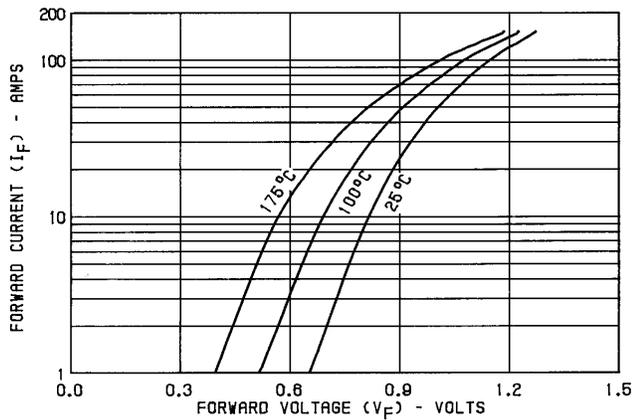


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

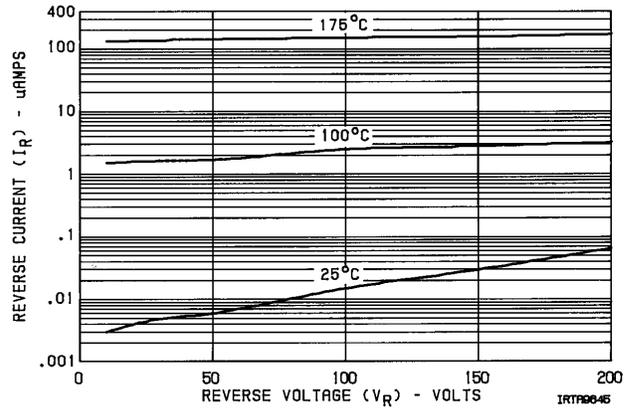


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

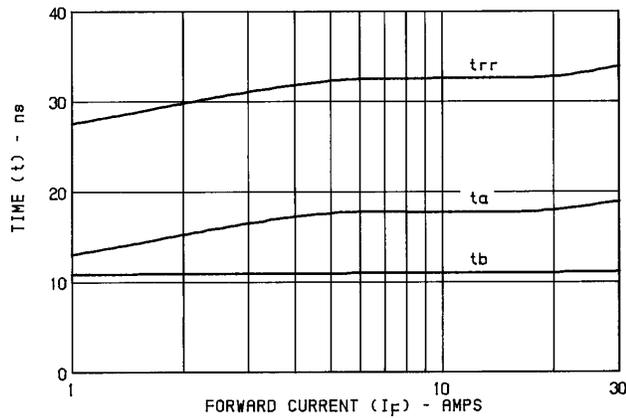


FIGURE 5. TYPICAL t_{RR} , t_A AND t_B CURVES vs FORWARD CURRENT

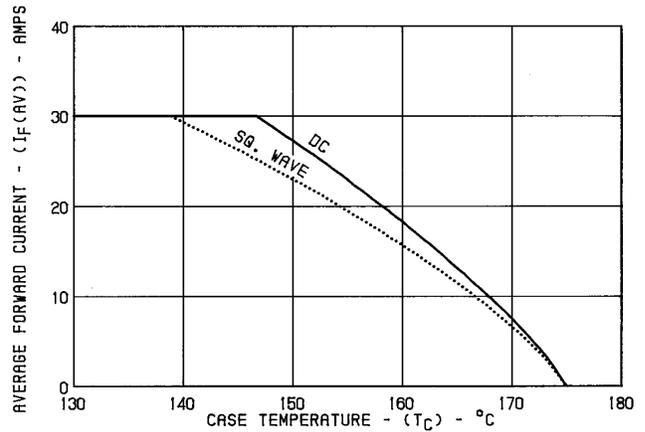


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

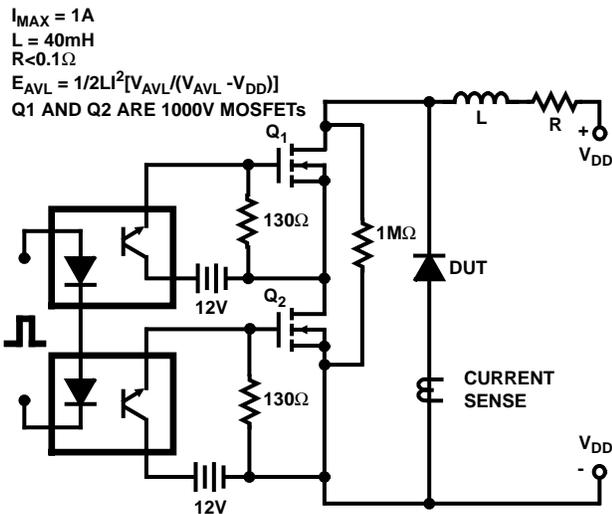


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

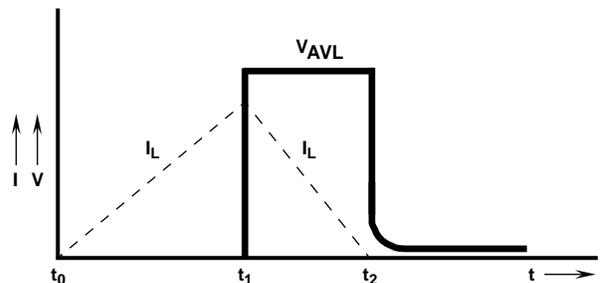


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS