HARRIS SEMICONDUCTOR

RURG3070, RURG3080, RURG3090, RURG30100

April 1995

30A, 700V - 1000V Ultrafast Diodes

Features

- Ultrafast with Soft Recovery . . . . . <110ns
- Operating Temperature . . . . . +175°C
- Reverse Voltage Up To 1000V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Description

RURG3070, RURG3080, RURG3090 and RURG30100 (TA9904) are ultrafast diodes with soft recovery characteristics (t_{RR} < 110ns). 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.

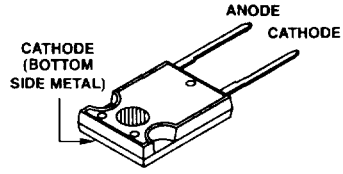
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURG3070	TO-247	RURG3070
RURG3080	TO-247	RURG3080
RURG3090	TO-247	RURG3090
RURG30100	TO-247	RURG30100

NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE 2 LEAD TO-247



Symbol

Absolute Maximum Ratings T_C = +25°C, Unless Otherwise Specified

		RURG3070	RURG3080	RURG3090	RURG30100	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 (T_C = +117°C)	$I_{F(AV)}$	30	30	30	30	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	60	60	60	60	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz)	I_{FSM}	300	300	300	300	A
Maximum Power Dissipation	P_D	125	125	125	125	W
Avalanche Energy	E_{AVL}	30	30	30	30	mj
Operating and Storage Temperature	T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	-65 to +175	°C

File Number **3213.1**

Electrical Specifications T_C = +25°C, Unless Otherwise Specified

SYMBOL	TEST CONDITION	LIMITS												UNITS
		RURG3070			RURG3080			RURG3090			RURG30100			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	I_F = 30A, T_C = +25°C	-	-	1.8	-	-	1.8	-	-	1.8	-	-	1.8	V
V_F	I_F = 30A, T_C = +150°C	-	-	1.6	-	-	1.6	-	-	1.6	-	-	1.6	V
I_R	V_R = 700V, T_C = +25°C	-	-	500	-	-	-	-	-	-	-	-	-	µA
	V_R =800V, T_C = +25°C	-	-	-	-	-	500	-	-	-	-	-	-	µA
	V_R = 900V, T_C = +25°C	-	-	-	-	-	-	-	-	500	-	-	-	µA
	V_R = 1000V, T_C = +25°C	-	-	-	-	-	-	-	-	-	-	-	500	µA
I_R	V_R = 700V, T_C = +150°C	-	-	1	-	-	-	-	-	-	-	-	-	mA
	V_R = 800V, T_C = +150°C	-	-	-	-	-	1	-	-	-	-	-	-	mA
	V_R = 900V, T_C = +150°C	-	-	-	-	-	-	-	-	1	-	-	-	mA
	V_R = 1000V, T_C = +150°C	-	-	-	-	-	-	-	-	-	-	-	1	mA
t_{RR}	I_F = 1A, dI_F/dt = 100A/µs	-	-	110	-	-	110	-	-	110	-	-	110	ns
	I_F = 30A, dI_F/dt = 100A/µs	-	-	150	-	-	150	-	-	150	-	-	150	ns
t_A	I_F = 30A, dI_F/dt = 100A/µs	-	90	-	-	90	-	-	90	-	-	90	-	ns
t_B	I_F = 30A, dI_F/dt = 100A/µs	-	45	-	-	45	-	-	45	-	-	45	-	ns
$R_{\theta JC}$		-	-	1.2	-	-	1.2	-	-	1.2	-	-	1.2	°C/W

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300µs, 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.

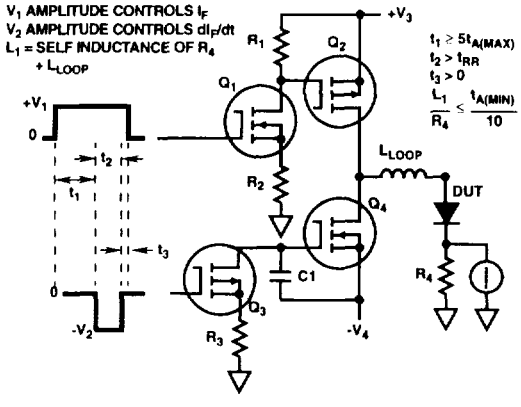


FIGURE 1. t_{RR} TEST CIRCUIT

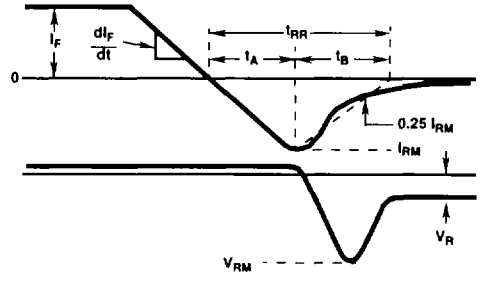


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

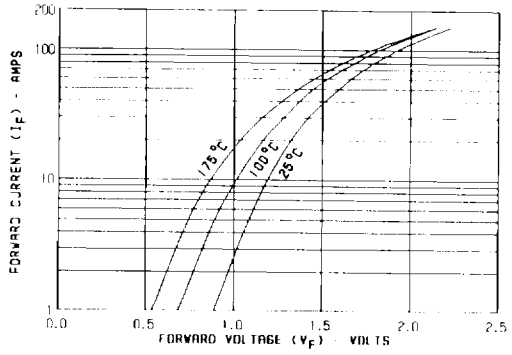


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

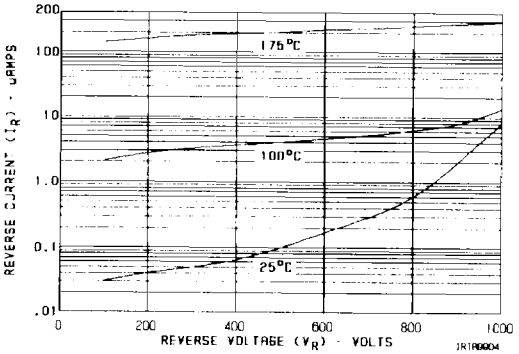


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

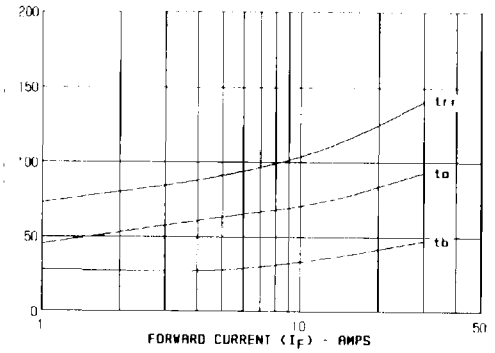


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT

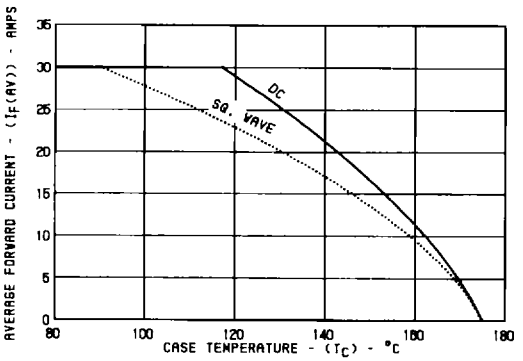


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

I_{MAX} = 1A
L = 40mH
R<0.1Ω
$E_{AVL} = 1/2LI^2[V_{AVL}/(V_{AVL} - V_{DD})]$
Q1 AND Q2 ARE 1000V MOSFETs

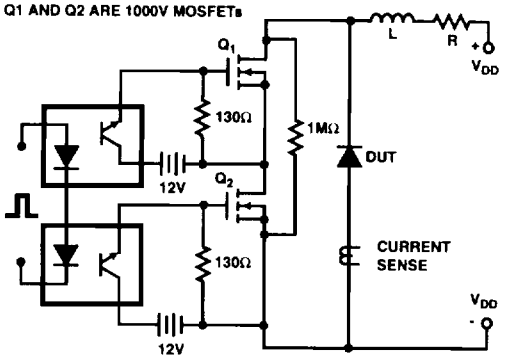


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

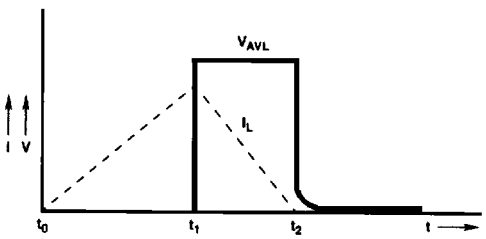


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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ULTRAFAST SINGLE DIODES