HARRIS SEMICONDUCTOR

RURP3070, RURP3080, RURP3090, RURP30100

April 1995

30A, 700V - 1000V Ultrafast Diodes

Features

- **Ultrafast with Soft Recovery Characteristic (t_{RR} < 110ns)**
- **+175°C Rated Junction Temperature**
- **Reverse Voltage Up to 1000V**
- **Avalanche Energy Rated**
- **Planar Construction**

Applications

- **Switching Power Supply**
- **Power Switching Circuits**
- **General Purpose**

Description

RURP3070, RURP3080, RURP3090, RURP30100 are ultrafast diodes with soft recovery characteristics (t_{RR} < 110ns). They have a low forward voltage drop and are silicon nitride passivated, ion-implanted, epitaxial construction.

These devices are intended for use as flywheel/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 characteristics minimizes ringing and electrical noise in many power switching circuits thus reducing power loss in the switching transistor.

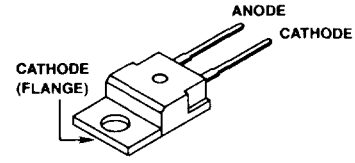
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURP3070	TO-220AC	RURP3070
RURP3080	TO-220AC	RURP3080
RURP3090	TO-220AC	RURP3090
RURP30100	TO-220AC	RUR30100

NOTE: When ordering, use the entire part number.

Package

JEDEC TO-220AC



Symbol

5 ULTRAFAST SINGLE DIODES

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

		RURP3070	RURP3080	RURP3090	RURP30100
Peak Repetitive Reverse Voltage	V_{RRM}	700V	800V	900V	1000V
Working Peak Reverse Voltage	V_{RWM}	700V	800V	900V	1000V
DC Blocking Voltage	V_R	700V	800V	900V	1000V
Average Rectified Forward Current (T_C = +121°C)	$I_{F(AV)}$	30A	30A	30A	30A
Peak Forward Repetitive Current (Square wave 20kHz)	I_{FRM}	60A	60A	60A	60A
Nonrepetitive Peak Surge Current (Surge applied at rated load condition halfwave 1 phase 60Hz)	I_{FSM}	300A	300A	300A	300A
Maximum Power Dissipation	P_D	125W	125W	125W	125W
Operating and Storage Temperature	T_{STG}, T_J	-65°C to +175°C	-65°C to +175°C	-65°C to +175°C	-65°C to +175°C

File Number **2877.3**

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

SYMBOL	TEST CONDITION	LIMITS												UNITS
		RURP3070			RURP3080			RURP3090			RURP30100			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	I_F = 30A, T_C = +150°C	-	-	1.60	-	-	1.60	-	-	1.60	-	-	1.60	V
	I_F = 30A, T_C = +25°C	-	-	1.80	-	-	1.80	-	-	1.80	-	-	1.80	V
I_R at T_C = +150°C	V_R = 700V	-	-	1	-	-	-	-	-	-	-	-	-	mA
	V_R = 800V	-	-	-	-	-	1	-	-	-	-	-	-	mA
	V_R = 900V	-	-	-	-	-	-	-	-	1	-	-	-	mA
	V_R = 1000V	-	-	-	-	-	-	-	-	-	-	-	1	mA
I_R at T_C = +25°C	V_R = 700V	-	-	500	-	-	-	-	-	-	-	-	-	µA
	V_R = 800V	-	-	-	-	-	500	-	-	-	-	-	-	µA
	V_R = 900V	-	-	-	-	-	-	-	-	500	-	-	-	µA
	V_R = 1000V	-	-	-	-	-	-	-	-	-	-	-	500	µA
t_{RR}	I_F = 1A	-	-	110	-	-	110	-	-	110	-	-	110	ns
	I_F = 30A	-	-	150	-	-	150	-	-	150	-	-	150	ns
t_A	I_F = 30A	-	90	-	-	90	-	-	90	-	-	90	-	ns
t_B	I_F = 30A	-	45	-	-	45	-	-	45	-	-	45	-	ns
R_{thJC}		-	-	1.2	-	-	1.2	-	-	1.2	-	-	1.2	°C/W
E_{AVL}		-	-	20	-	-	20	-	-	20	-	-	20	mj

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300µs, D = 2%).

I_R = Instantaneous reverse current.

t_{RR} = Reverse recovery time at dI_F/dt = 100A/µs (See Figure 2), summation of $t_A + t_B$.

t_A = Time to reach peak reverse current at dI_F/dt = 100A/µs (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_{thJC} = Thermal resistance junction to case.

E_{AVL} = Controlled avalanche energy (See Figures 7 and 8).

pw = pulse width.

D = duty cycle.

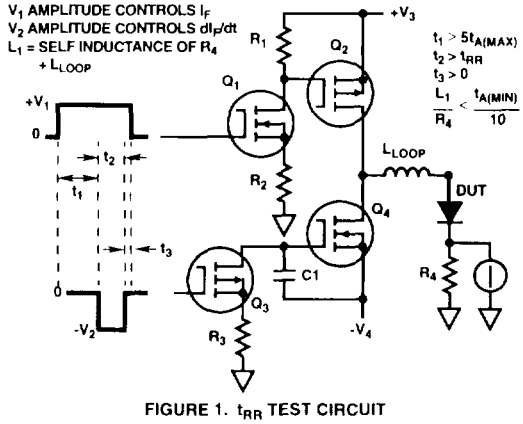


FIGURE 1. t_{RR} TEST CIRCUIT

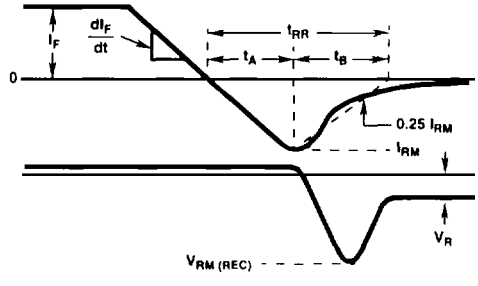


FIGURE 2. DEFINITIONS OF t_{RR}, t_A AND t_B

Typical Performance Curves

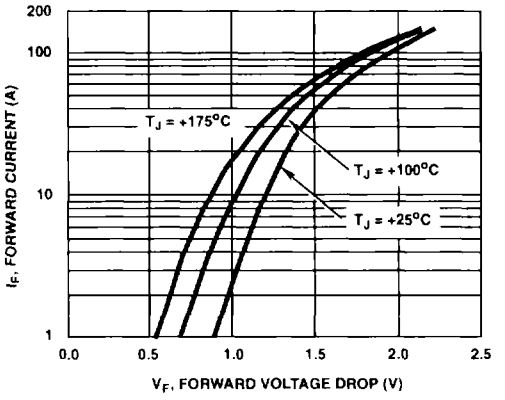


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

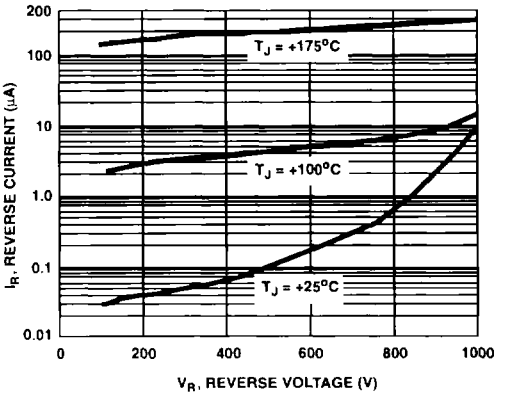


FIGURE 4. REVERSE VOLTAGE vs REVERSE CURRENT CHARACTERISTIC

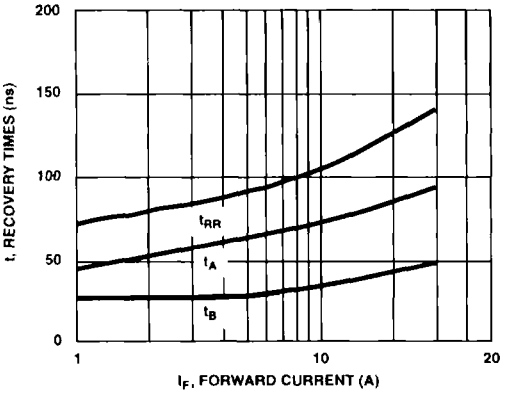


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT

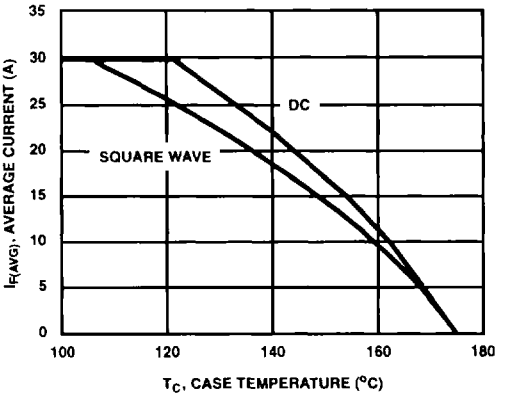


FIGURE 6. TYPICAL CURRENT DERATING CURVE vs CASE TEMPERATURE

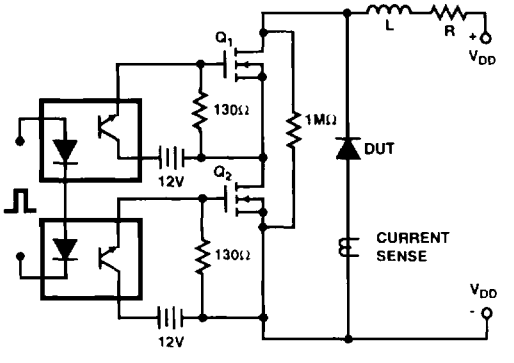


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

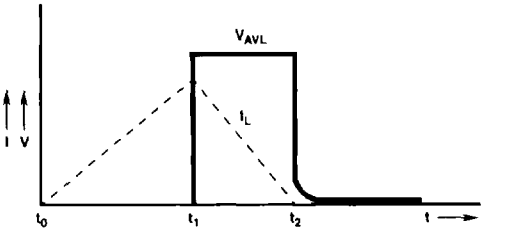


FIGURE 8. CURRENT VOLTAGE WAVEFORM

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