# RURG8070, RURG8080, RURG8090, RURG80100

April 1995

## 80A, 700V - 1000V Ultrafast Diodes

### Features

- **Ultrafast with Soft Recovery . . . . . <125ns**
- **Operating Temperature . . . . . +175$^{o}$C**
- **Reverse Voltage Up To . . . . . 1000V**
- **Avalanche Energy Rated**
- **Planar Construction**

### Applications

- **Switching Power Supplies**
- **Power Switching Circuits**
- **General Purpose**

### Description

RURG8070, RURG8080, RURG8090 and RURG80100 are ultrafast diodes with soft recovery characteristics ($t_{RR}$ < 125ns). 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.

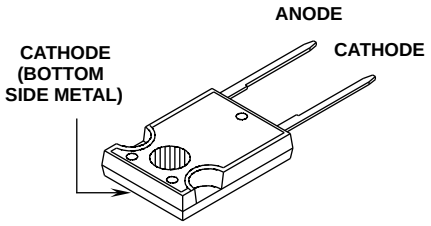
**PACKAGING AVAILABILITY**

| PART NUMBER | PACKAGE | BRAND |
|---|---|---|
| RURG8070 | TO-247 | RURG8070 |
| RURG8080 | TO-247 | RURG8080 |
| RURG8090 | TO-247 | RURG8090 |
| RURG80100 | TO-247 | RURG80100 |

NOTE: When ordering, use the entire part number.

### Package

**JEDEC STYLE 2 LEAD TO-247**




### Symbol


### Absolute Maximum Ratings $T_C$ = +25$^{o}$C, Unless Otherwise Specified

| | | RURG8070 | RURG8080 | RURG8090 | RURG80100 | 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 ($T_C$ = +53$^{o}$C) | $I_{F(AV)}$ | 80 | 80 | 80 | 80 | A |
| Repetitive Peak Surge Current (Square Wave, 20kHz) | $I_{FSM}$ | 160 | 160 | 160 | 160 | A |
| Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz) | $I_{FSM}$ | 500 | 500 | 500 | 500 | A |
| Maximum Power Dissipation | $P_D$ | 180 | 180 | 180 | 180 | W |
| Avalanche Energy (L = 40mH) | $E_{AVL}$ | 50 | 50 | 50 | 50 | mj |
| Operating and Storage Temperature | $T_{STG}$, $T_J$ | -65 to +175 | -65 to +175 | -65 to +175 | -65 to +175 | $^{o}$C |



File Number **3371.2**

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

| SYMBOL | TEST CONDITION | LIMITS | | | | | | | | | | | | UNITS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RURG8070 | | | RURG8080 | | | RURG8090 | | | RURG80100 | | | |
| | | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_F$ | $I_F$ = 80A, $T_C$ = +25°C | - | - | 1.9 | - | - | 1.9 | - | - | 1.9 | - | - | 1.9 | V |
| $V_F$ | $I_F$ = 80A, $T_C$ = +150°C | - | - | 1.7 | - | - | 1.7 | - | - | 1.7 | - | - | 1.7 | 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 | - | - | 2 | - | - | - | - | - | - | - | - | - | mA |
| | $V_R$ = 800V, $T_C$ = +150°C | - | - | - | - | - | 2 | - | - | - | - | - | - | mA |
| | $V_R$ = 900V, $T_C$ = +150°C | - | - | - | - | - | - | - | - | 2 | - | - | - | mA |
| | $V_R$ = 1000V, $T_C$ = +150°C | - | - | - | - | - | - | - | - | - | - | - | 2 | mA |
| $t_{RR}$ | $I_F$ = 1A, $dI_F/dt$ = 100A/µs | - | - | 125 | - | - | 125 | - | - | 125 | - | - | 125 | ns |
| | $I_F$ = 80A, $dI_F/dt$ = 100A/µs | - | - | 200 | - | - | 200 | - | - | 200 | - | - | 200 | ns |
| $t_A$ | $I_F$ = 80A, $dI_F/d$ t = 100A/µs | - | 90 | - | - | 90 | - | - | 90 | - | - | 90 | - | ns |
| $t_B$ | $I_F$ = 80A, $dI_F/dt$ = 100A/µs | - | 65 | - | - | 65 | - | - | 65 | - | - | 65 | - | ns |
| $R_{\theta JC}$ | | - | - | 0.83 | - | - | 0.83 | - | - | 0.83 | - | - | 0.83 | °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.

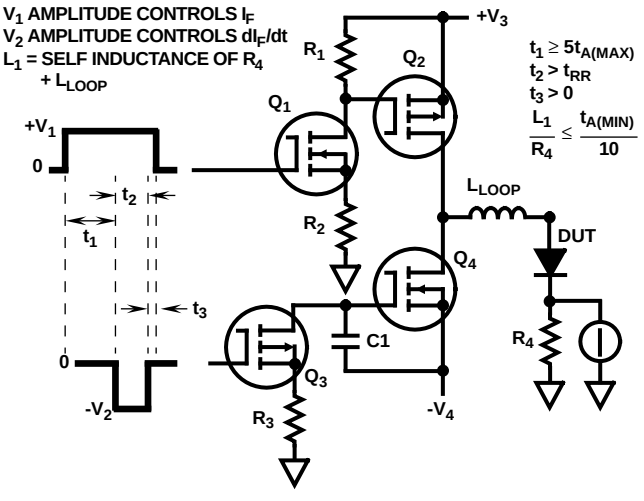



**FIGURE 1. $t_{RR}$ TEST CIRCUIT**

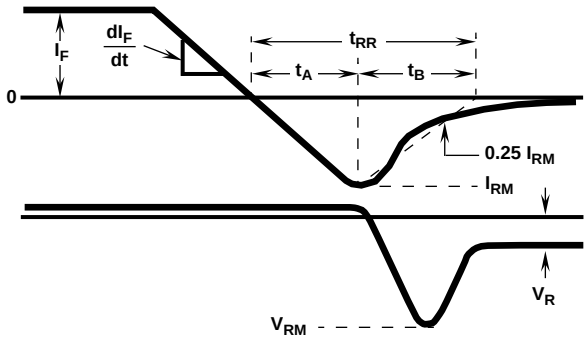



**FIGURE 2. $t_{RR}$ WAVEFORMS AND DEFINITIONS**

## Typical Performance Curves

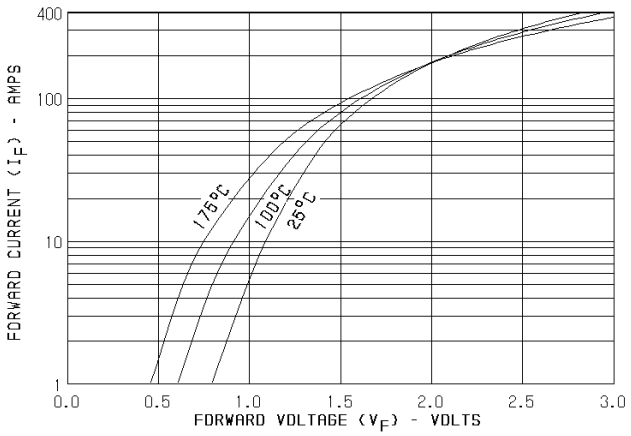



FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

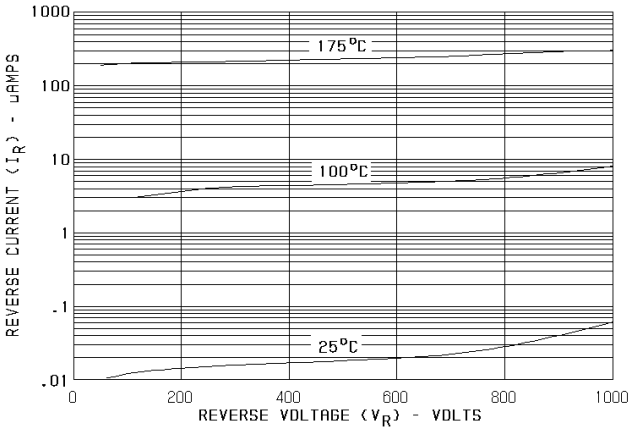



FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

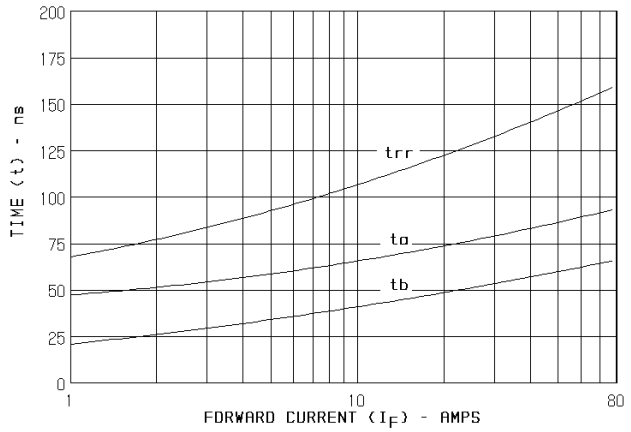



FIGURE 5. TYPICAL $t_{RR}$, $t_A$ AND $t_B$ CURVES vs FORWARD CURRENT

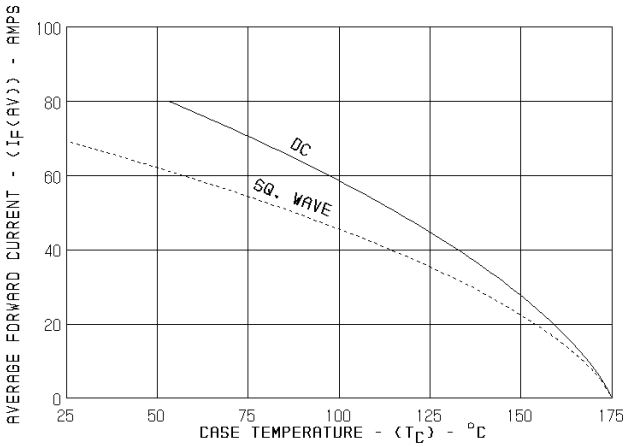



FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

$I_{MAX}$ = 1A
L = 40mH
R < 0.1Ω
$E_{AVL} = 1/2LI^2 [V_{AVL}/(V_{AVL} - V_{DD})]$
$Q_1$ & $Q_2$ ARE 1000V MOSFETs

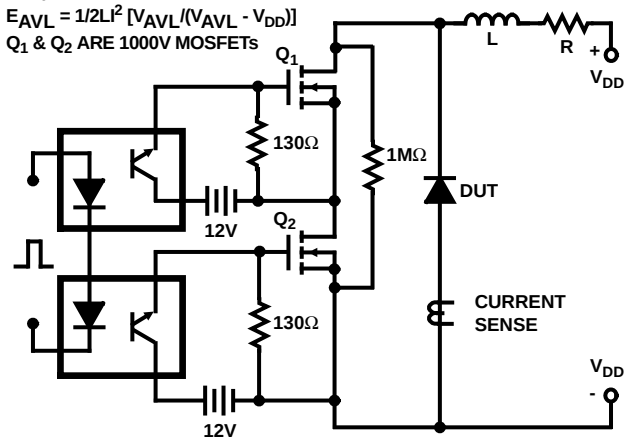



FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

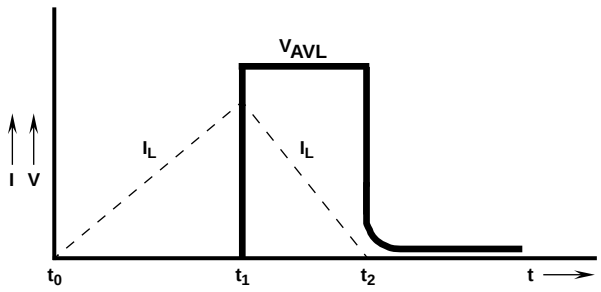



FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS