



HARRIS

HARRIS SEMICONDUCTOR

RUR3070/3080, RUR3090/30100

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May 1992

30A Ultrafast Diode
With Soft Recovery Characteristic

T-03-19

Features

- Ultrafast with Soft Recovery Characteristic ($t_{rr} < 110\text{ns}$)
- +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

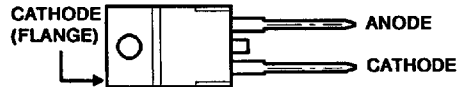
RUR3070, RUR3080, RUR3090, RUR30100 are ultrafast diodes with soft recovery characteristics ($t_{rr} < 110\text{ns}$). They have a low forward voltage drop and are silicon nitride passivated, ion-implanted, epitaxial construction.

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.

All are supplied in TO-220AC packages.

Package

TO-220AC
TOP VIEW



Symbol



Absolute Maximum Ratings ($T_C = +25^\circ\text{C}$)

| | RUR3070 | RUR3080 | RUR3090 | RUR30100 |
|---|-----------------|-----------------|-----------------|-----------------|
| 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..... $I_{F(AV)}$ ($T_C = +121^\circ\text{C}$) | 30A | 30A | 30A | 30A |
| Peak Forward Repetitive Current..... I_{FRM} (Square wave 20kHz) | 60A | 60A | 60A | 60A |
| Nonrepetitive Peak Surge Current..... I_{FSM} (Surge applied at rated load condition halfwave 1 phase 60Hz) | 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 |

Electrical Characteristics ($T_C = +25^\circ\text{C}$) Unless Otherwise Specified.

| SYMBOL | TEST CONDITION | LIMITS | | | | | | | | | | | | UNITS |
|---------------------------------------|--|---------|-----|------|---------|-----|------|---------|-----|------|----------|-----|------|---------------------------|
| | | RUR3070 | | | RUR3080 | | | RUR3090 | | | RUR30100 | | | |
| | | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | |
| V_F | $I_F = 30\text{A}$ $T_C = +150^\circ\text{C}$ | - | - | 1.60 | - | - | 1.60 | - | - | 1.60 | - | - | 1.60 | V |
| | $I_F = 30\text{A}$ $T_C = +25^\circ\text{C}$ | - | - | 1.80 | - | - | 1.80 | - | - | 1.80 | - | - | 1.8 | V |
| $I_R @$ $T_C = +150^\circ\text{C}$ | $V_R = 700\text{V}$ | - | - | 1 | - | - | - | - | - | - | - | - | - | mA |
| | $V_R = 800\text{V}$ | - | - | - | - | - | 1 | - | - | - | - | - | - | mA |
| | $V_R = 900\text{V}$ | - | - | - | - | - | - | - | - | 1 | - | - | - | mA |
| | $V_R = 1000\text{V}$ | - | - | - | - | - | - | - | - | - | - | 1 | - | mA |
| $I_R @$ $T_C = +25^\circ\text{C}$ | $V_R = 700\text{V}$ | - | - | 100 | - | - | - | - | - | - | - | - | - | μA |
| | $V_R = 800\text{V}$ | - | - | - | - | - | 100 | - | - | - | - | - | - | μA |
| | $V_R = 900\text{V}$ | - | - | - | - | - | - | - | - | 100 | - | - | - | μA |
| | $V_R = 1000\text{V}$ | - | - | - | - | - | - | - | - | - | - | 100 | - | μA |
| t_{rr} | $I_F = 1\text{A}$ | - | - | 110 | - | - | 110 | - | - | 110 | - | - | 110 | ns |
| | $I_F = 30\text{A}$ | - | - | 150 | - | - | 150 | - | - | 150 | - | - | 150 | ns |
| t_a | $I_F = 30\text{A}$ | - | 90 | - | - | 90 | - | - | 90 | - | - | 90 | - | ns |
| t_b | $I_F = 30\text{A}$ | - | 45 | - | - | 45 | - | - | 45 | - | - | 45 | - | ns |
| $R_{\theta JC}$ | | - | - | 1.2 | - | - | 1.2 | - | - | 1.2 | - | - | 1.2 | $^\circ\text{C}/\text{W}$ |
| W_{avl} | | - | - | 20 | - | - | 20 | - | - | 20 | - | - | 20 | mJ |

Definitions

V_F = Instantaneous forward voltage ($p_w = 300\mu\text{s}$, $D = 2\%$).

I_R = Instantaneous reverse current ($p_w = 300\mu\text{s}$, $D = 2\%$).

t_{rr} = Reverse recovery time at $dI_F/dt = 100\text{A}/\mu\text{s}$, summation of $t_a + t_b$.

t_a = Time to reach peak reverse current at $dI_F/dt = 100\text{A}/\mu\text{s}$ (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.

W_{avl} = Controlled avalanche energy (See Figures 7 & 8).

p_w = pulse width.

D = duty cycle.

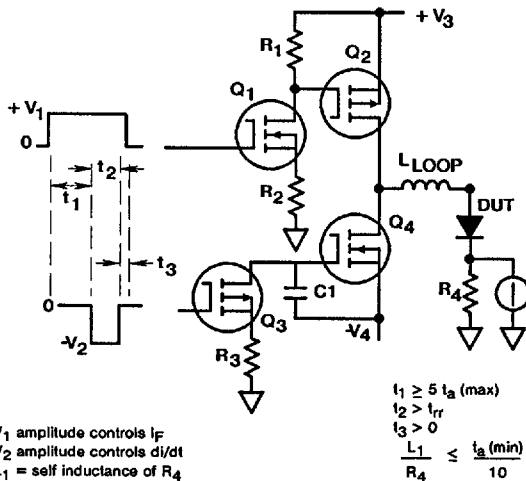


FIGURE 1. t_{rr} TEST CIRCUIT

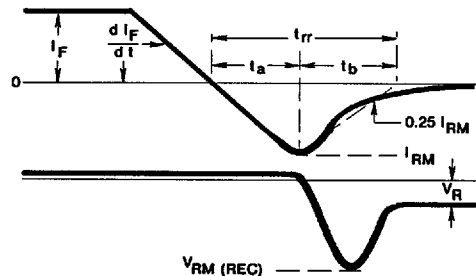


FIGURE 2. DEFINITIONS OF t_{rr} , t_a AND t_b

ULTRA-FAST
RECTIFIERS

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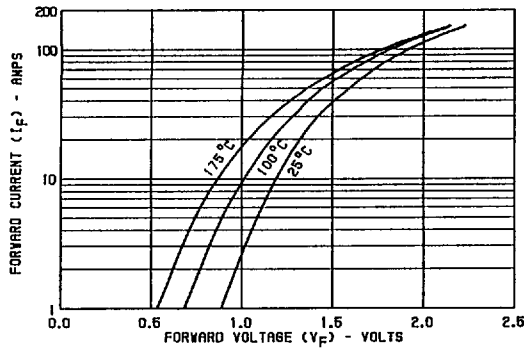


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

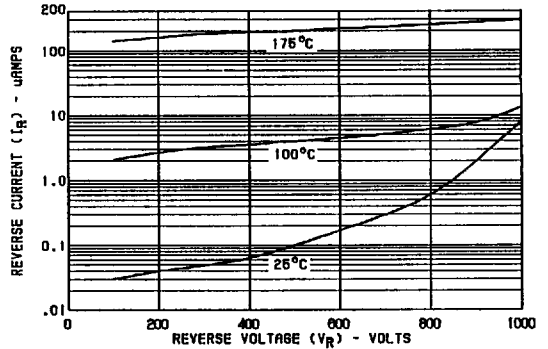


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

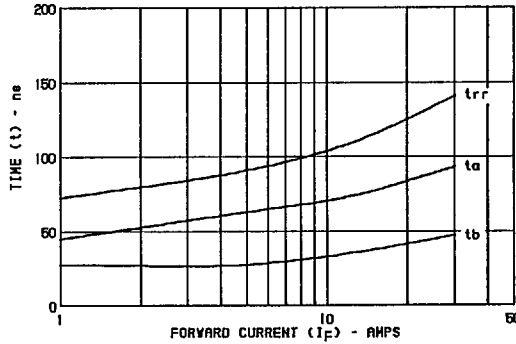


FIGURE 5. TYPICAL t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

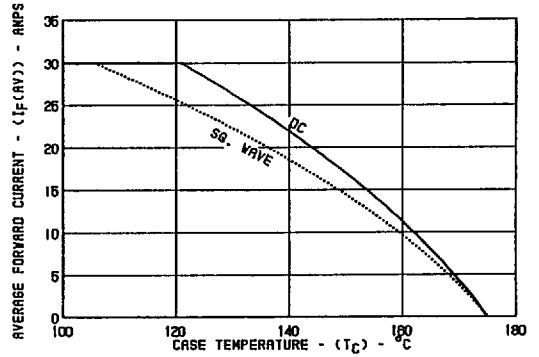


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

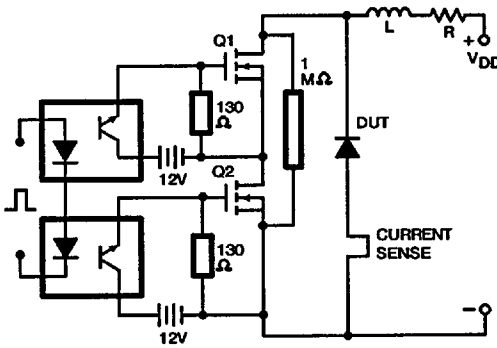


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

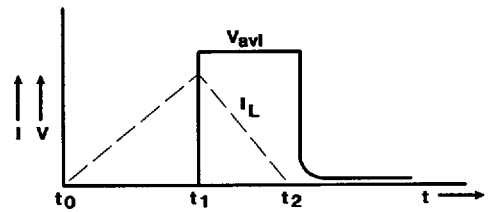


FIGURE 8. AVALANCHE CURRENT & VOLTAGE WAVEFORM

$$I_{L\text{peak}} = 1A, L = 40mH, R < 0.1\Omega, W_{avl} = (1/2) Li^2 [V_{avl}/(V_{avl}-V_{dd})]$$

Q1 and Q2 are 1000V MOSFETs