

### 30A, 200V Ultrafast Diode

The RURG3020 is an ultrafast diode with soft recovery characteristics ( $t_{rr} < 45\text{ns}$ ). It has low forward voltage drop and is of silicon nitride passivated ion-implanted epitaxial planar construction.

This device is intended for use as a freewheeling/clamping diode and rectifier in a variety of switching power supplies and other power switching applications. Its low stored charge and ultrafast recovery with soft recovery characteristics minimizes ringing and electrical noise in many power switching circuits, reducing power loss in the switching transistors.

Formerly developmental type TA09645.

### Ordering Information

| PART NUMBER | PACKAGE | BRAND    |
|-------------|---------|----------|
| RURG3020    | TO-247  | RURG3020 |

NOTE: When ordering, use the entire part number.

### Symbol



### Features

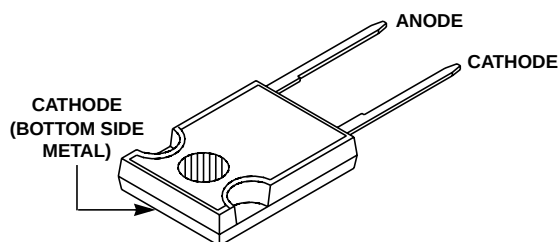
- Ultrafast with Soft Recovery . . . . . <45ns
- Operating Temperature . . . . . 175°C
- Reverse Voltage . . . . . 200V
- Avalanche Energy Rated
- Planar Construction

### Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

### Packaging

JEDEC STYLE 2 LEAD TO-247



### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , Unless Otherwise Specified

|                                                                                        | RURG3020   | UNITS |
|----------------------------------------------------------------------------------------|------------|-------|
| Peak Repetitive Reverse Voltage . . . . . $V_{RRM}$                                    | 200        | V     |
| Working Peak Reverse Voltage . . . . . $V_{RWM}$                                       | 200        | V     |
| DC Blocking Voltage . . . . . $V_R$                                                    | 200        | V     |
| Average Rectified Forward Current . . . . . $I_F(AV)$<br>( $T_C = 145^\circ\text{C}$ ) | 30         | A     |
| Repetitive Peak Surge Current . . . . . $I_{FRM}$<br>(Square Wave, 20kHz)              | 70         | A     |
| Nonrepetitive Peak Surge Current . . . . . $I_{FSM}$<br>(Halfwave, 1 Phase, 60Hz)      | 325        | A     |
| Maximum Power Dissipation . . . . . $P_D$                                              | 125        | W     |
| Avalanche Energy (See Figures 7 and 8) . . . . . $E_{AVL}$                             | 20         | mJ    |
| Operating and Storage Temperature . . . . . $T_{STG}, T_J$                             | -65 to 175 | °C    |

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

| SYMBOL          | TEST CONDITION                                           | MIN | TYP | MAX  | UNITS                     |
|-----------------|----------------------------------------------------------|-----|-----|------|---------------------------|
| $V_F$           | $I_F = 30\text{A}$                                       | -   | -   | 1.0  | V                         |
|                 | $I_F = 30\text{A}$ , $T_C = 150^\circ\text{C}$           | -   | -   | 0.85 | V                         |
| $I_R$           | $V_R = 200\text{V}$                                      | -   | -   | 250  | $\mu\text{A}$             |
|                 | $V_R = 200\text{V}$ , $T_C = 150^\circ\text{C}$          | -   | -   | 1    | mA                        |
| $t_{rr}$        | $I_F = 1\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$  | -   | -   | 45   | ns                        |
|                 | $I_F = 30\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$ | -   | -   | 50   | ns                        |
| $t_a$           | $I_F = 30\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$ | -   | 20  | -    | ns                        |
| $t_b$           | $I_F = 30\text{A}$ , $dI_F/dt = 100\text{A}/\mu\text{s}$ | -   | 15  | -    | ns                        |
| $R_{\theta JC}$ |                                                          | -   | -   | 1.2  | $^\circ\text{C}/\text{W}$ |

**DEFINITIONS:**

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

$I_R$  = Instantaneous reverse current.

$t_{rr}$  = Reverse recovery time (See Figure 6), summation of  $t_a + t_b$ .

$t_a$  = Time to reach peak reverse current (See Figure 6).

$t_b$  = 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 6).

$R_{\theta JC}$  = Thermal resistance junction to case.

pw = Pulse width.

D = Duty cycle.

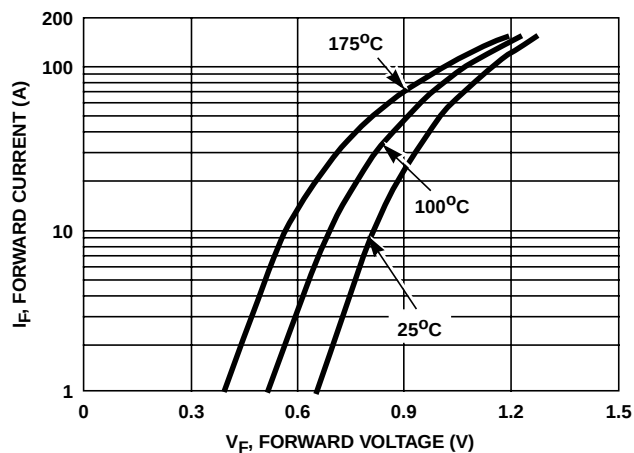
**Typical Performance Curves**

FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

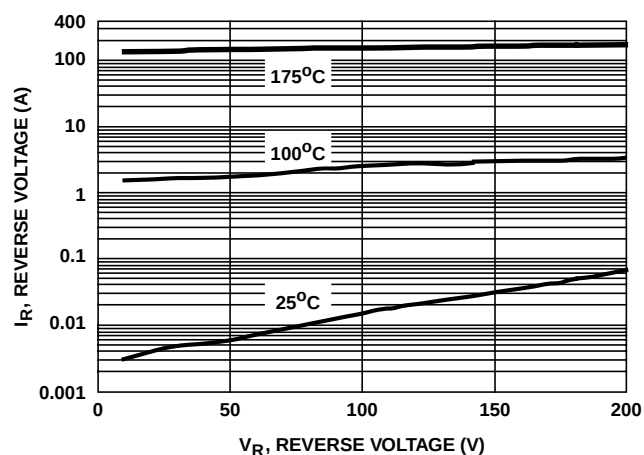


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

## Typical Performance Curves (Continued)

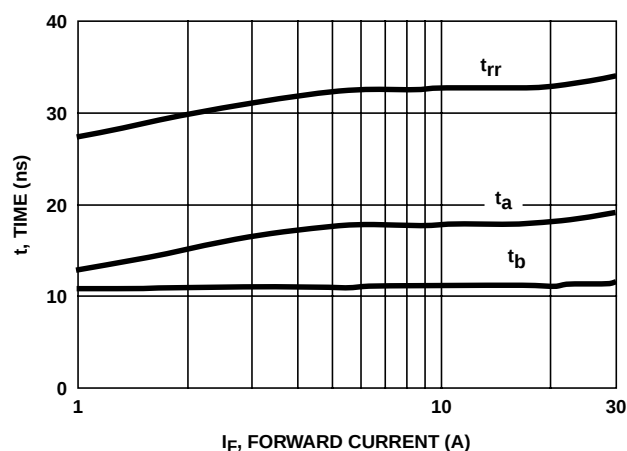
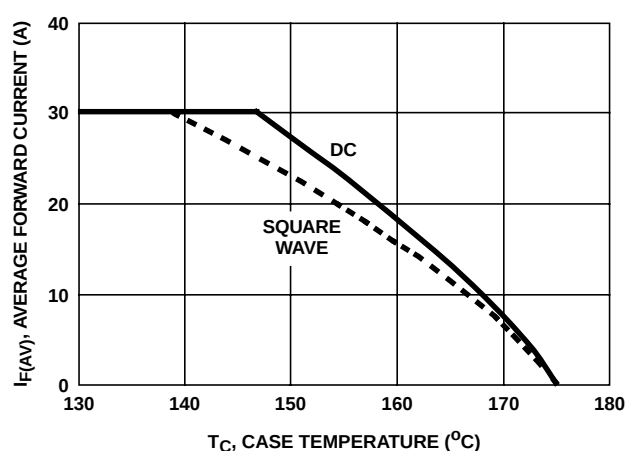
FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

FIGURE 4. CURRENT DERATING CURVE

## Test Circuits and Waveforms

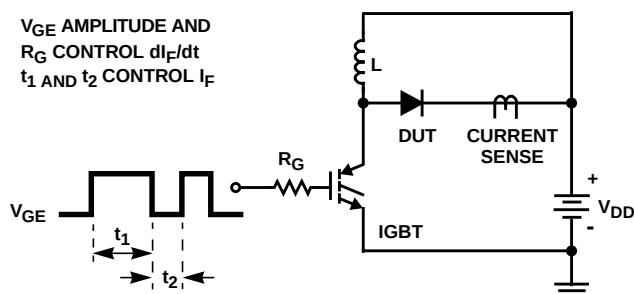
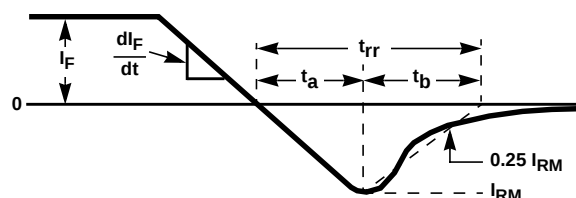
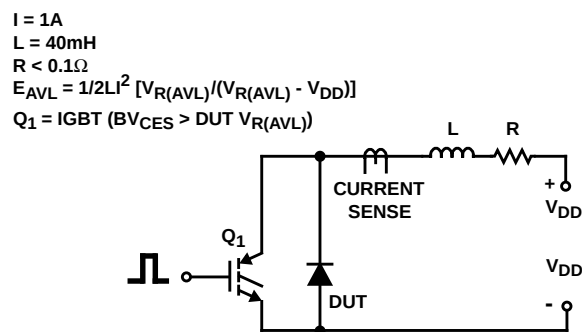
FIGURE 5.  $t_{rr}$  TEST CIRCUITFIGURE 6.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

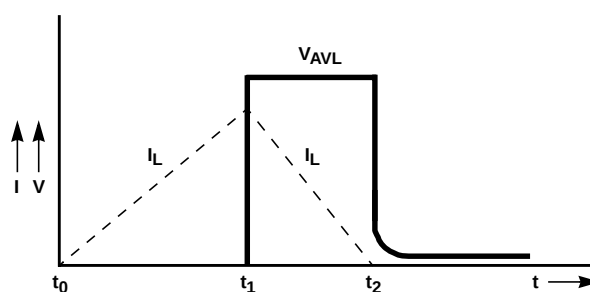


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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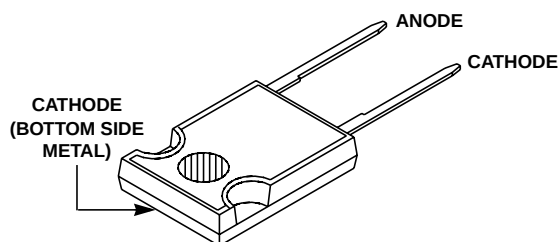
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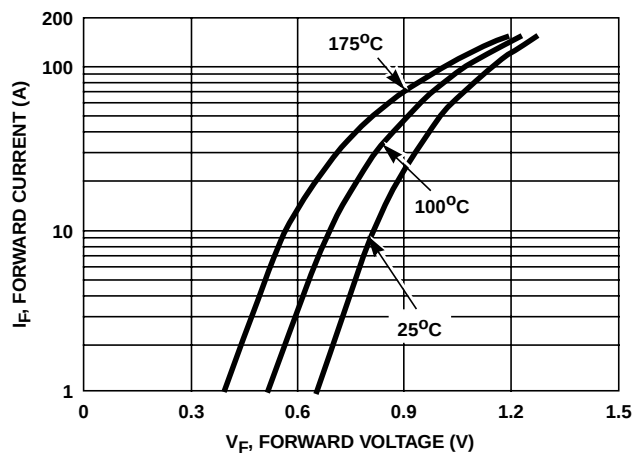
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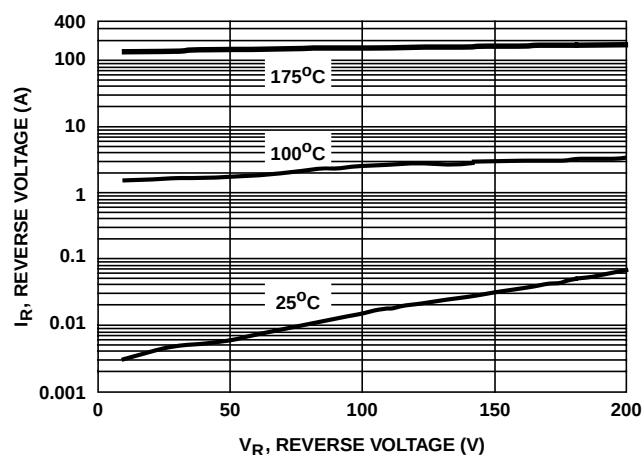


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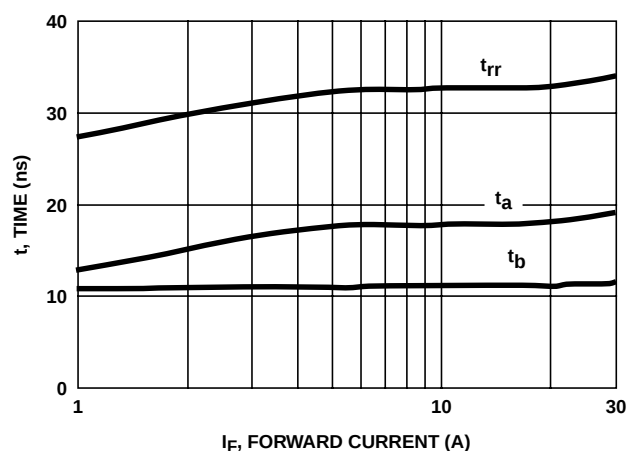
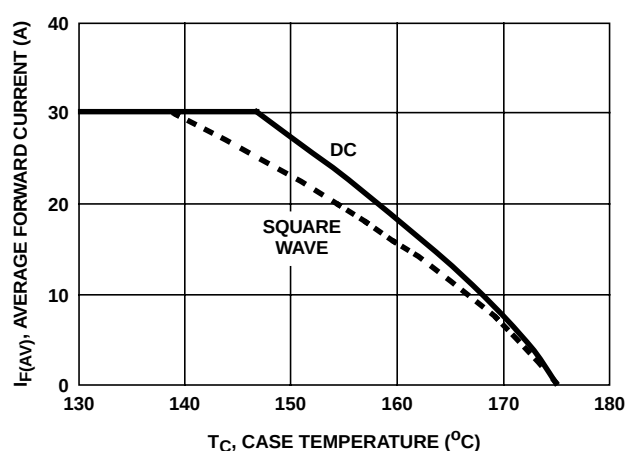
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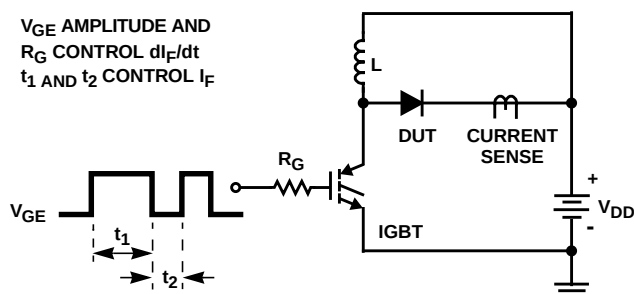
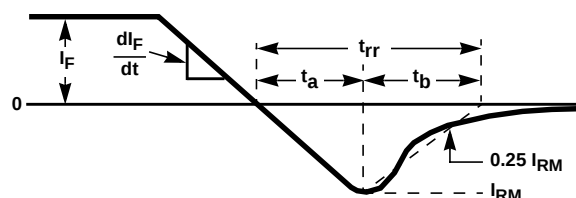
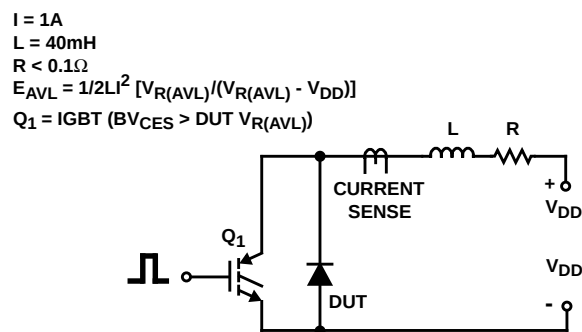
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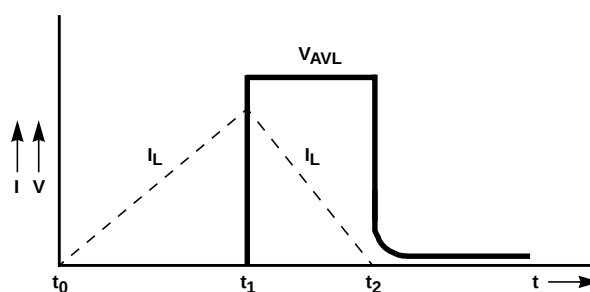


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