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## 50 A, 600 V, Ultrafast Diode

### Description

The RURG5060 is an ultrafast diode with low forward voltage drop. This device is intended for use as freewheeling and clamping diodes in a variety of switching power supplies and other power switching applications. It is specially suited for use in switching power supplies and industrial application.

### Ordering Information

| PART NUMBER | PACKAGE   | BRAND    |
|-------------|-----------|----------|
| RURG5060    | TO-247-2L | RURG5060 |

NOTE: When ordering, use the entire part number.

### Symbol



### Features

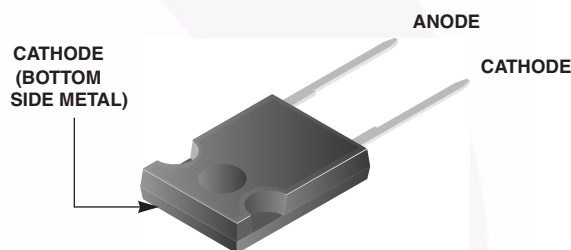
- Ultrafast Recovery  $t_{rr} = 75$  ns (@  $I_F = 50$  A)
- Max Forward Voltage,  $V_F = 1.6$  V (@  $T_C = 25^\circ\text{C}$ )
- 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS Compliant

### 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

|                                              | RURG5060   | UNIT             |
|----------------------------------------------|------------|------------------|
| Peak Repetitive Reverse Voltage .....        | 600        | V                |
| Working Peak Reverse Voltage .....           | 600        | V                |
| DC Blocking Voltage .....                    | 600        | V                |
| Average Rectified Forward Current .....      | 50         | A                |
| ( $T_C = 102^\circ\text{C}$ )                |            |                  |
| Repetitive Peak Surge Current .....          | 100        | A                |
| (Square Wave, 20kHz)                         |            |                  |
| Nonrepetitive Peak Surge Current .....       | 500        | A                |
| (Halfwave, 1 Phase, 60Hz)                    |            |                  |
| Maximum Power Dissipation .....              | 150        | W                |
| Avalanche Energy (See Figures 7 and 8) ..... | 40         | mJ               |
| Operating and Storage Temperature .....      | -65 to 175 | $^\circ\text{C}$ |

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

| SYMBOL          | TEST CONDITION                                          | MIN | TYP | MAX | UNIT                      |
|-----------------|---------------------------------------------------------|-----|-----|-----|---------------------------|
| $V_F$           | $I_F = 50\text{ A}$                                     | -   | -   | 1.6 | V                         |
|                 | $I_F = 50\text{ A}, T_C = 150^\circ\text{C}$            | -   | -   | 1.4 | V                         |
| $I_R$           | $V_R = 600\text{ V}$                                    | -   | -   | 250 | $\mu\text{A}$             |
|                 | $V_R = 600\text{ V}, T_C = 150^\circ\text{C}$           | -   | -   | 1.5 | mA                        |
| $t_{rr}$        | $I_F = 1\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$  | -   | -   | 65  | ns                        |
|                 | $I_F = 50\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$ | -   | -   | 75  | ns                        |
| $t_a$           | $I_F = 50\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$ | -   | 30  | -   | ns                        |
| $t_b$           | $I_F = 50\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$ | -   | 20  | -   | ns                        |
| $R_{\theta JC}$ |                                                         | -   | -   | 1   | $^\circ\text{C}/\text{W}$ |

**DEFINITIONS**

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

$I_R$  = Instantaneous reverse current.

$T_{rr}$  = Reverse recovery time at  $dI_F/dt = 100\text{ A}/\mu\text{s}$  (See Figure 6), 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 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.

$p_w$  = Pulse width.

$D$  = Duty cycle.

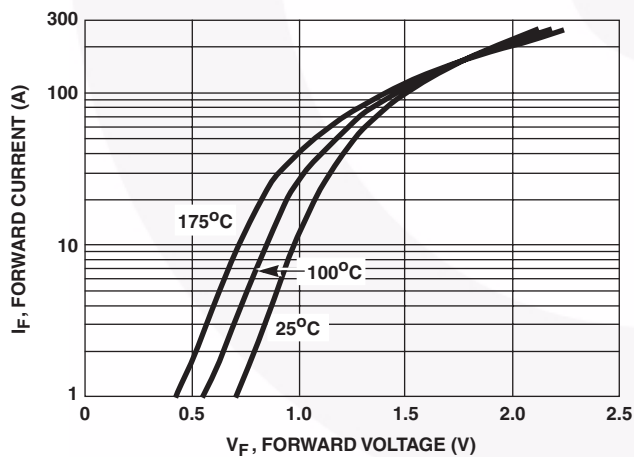
**Typical Performance Curves**

FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

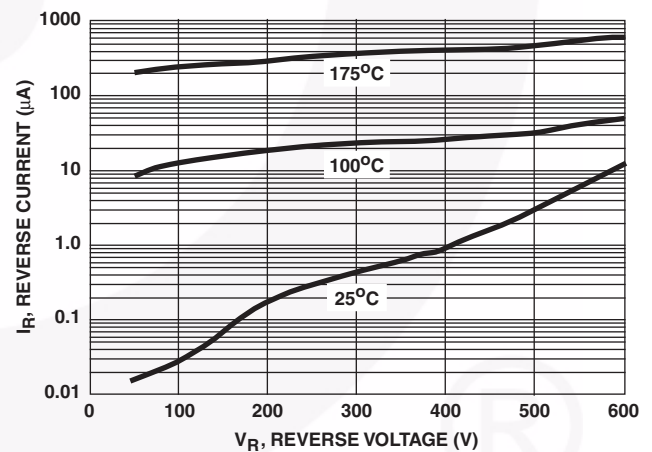


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

## Typical Performance Curves (Continued)

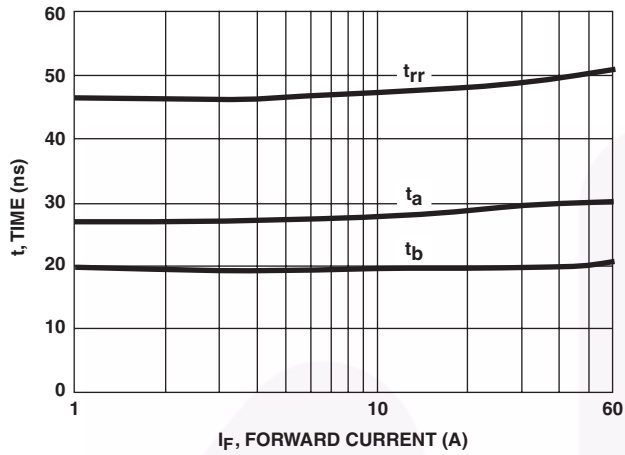


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

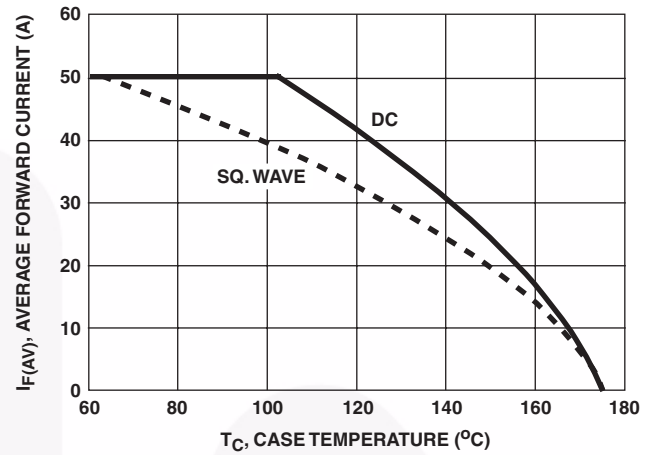


FIGURE 4. CURRENT DERATING CURVE

## Test Circuits and Waveforms

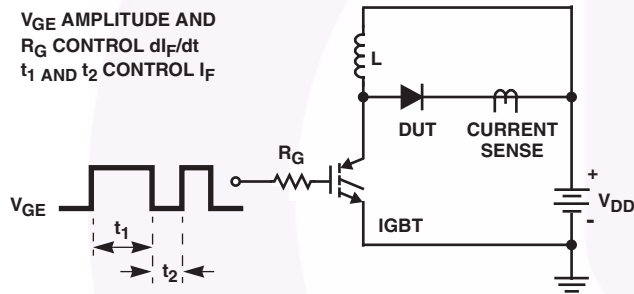


FIGURE 5.  $t_{rr}$  TEST CIRCUIT

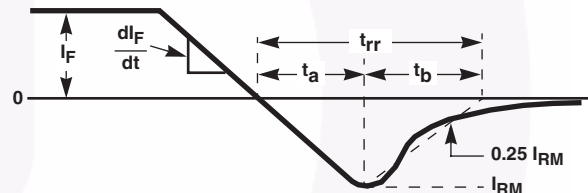


FIGURE 6.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

$I = 1.4A$   
 $L = 40mH$   
 $R < 0.1\Omega$   
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q_1 = IGBT (BV_{CES} > DUT V_{R(AVL)})$

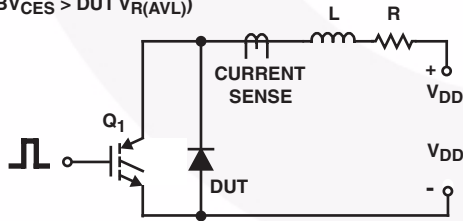


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

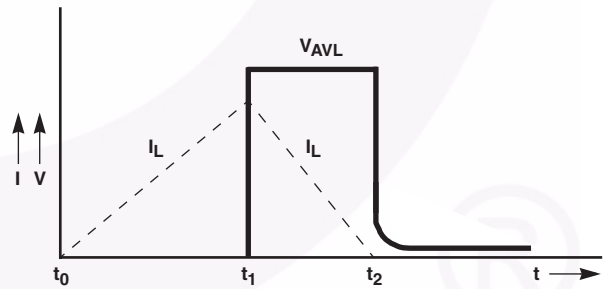
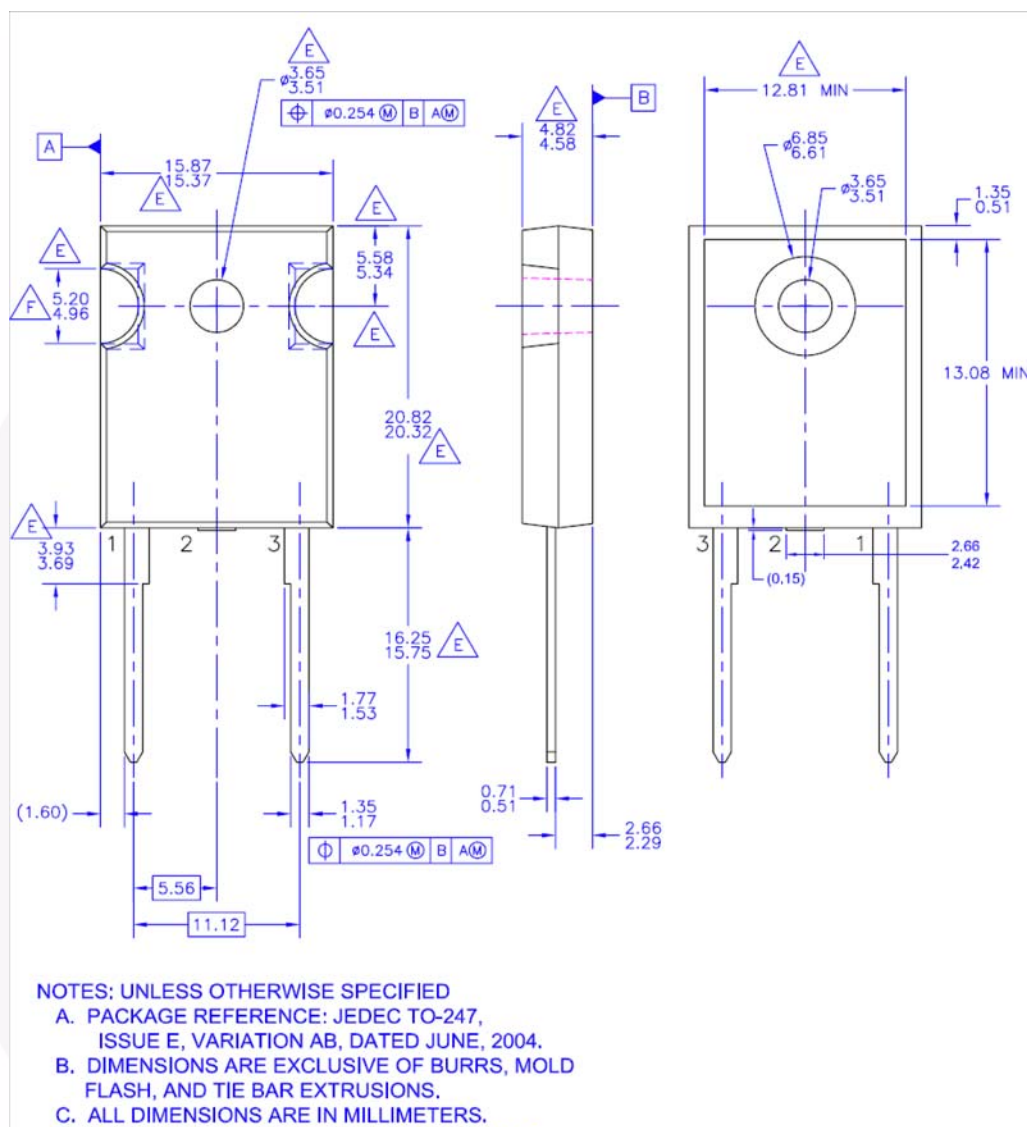


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

## Mechanical Dimensions

TO247-2L



**Figure 9. TO-247,Molded, 2LD, Jedec Option AB**

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