

# Ultrafast Dual Diode

## 30 A, 200 V

### RURG3020CC

#### Description

The RURG3020CC is an ultrafast dual 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.

#### Features

- Ultrafast Recovery  $t_{rr} = 50 \text{ ns}$  (@  $I_F = 30 \text{ A}$ )
- Max Forward Voltage,  $V_F = 1.0 \text{ V}$  (@  $T_C = 25^\circ\text{C}$ )
- Reverse Voltage,  $V_{RRM} = 200 \text{ V}$
- Avalanche Energy Rated
- This Device is Pb-Free and is RoHS Compliant

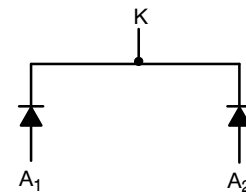
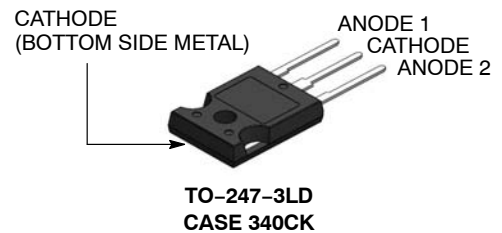
#### Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

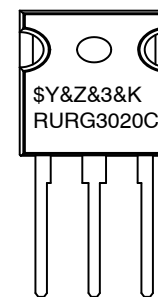


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#### MARKING DIAGRAM



|           |                         |
|-----------|-------------------------|
| \$Y       | = ON Semiconductor Logo |
| &Z        | = Assembly Plant Code   |
| &3        | = Numeric Date Code     |
| &K        | = Lot Code              |
| RURG3020C | = Specific Device Code  |

#### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

# RURG3020CC

## ABSOLUTE MAXIMUM RATINGS (Per Leg) ( $T_C = 25^\circ\text{C}$ )

| Parameter                                                                 | Symbol         | Rated      | Unit             |
|---------------------------------------------------------------------------|----------------|------------|------------------|
| 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 (Per Leg) ( $T_C = 145^\circ\text{C}$ ) | $I_{F(AV)}$    | 30         | A                |
| Repetitive Peak Surge Current (Square Wave, 20 kHz)                       | $I_{FRM}$      | 70         | A                |
| Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60 Hz)               | $I_{FSM}$      | 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 | $^\circ\text{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## PACKAGE MARKING AND ORDERING INFORMATION

| Device     | Device Marking | Package    | Shipping   |
|------------|----------------|------------|------------|
| RURG3020CC | RURG3020C      | TO-247-3LD | 450 / Tube |

## ELECTRICAL SPECIFICATION (Per Leg) ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

| Parameter                                                                                                                                                  | Symbol          | Test Conditions                                         | Min | Typ | Max  | Unit                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------|-----|-----|------|---------------------------|
| Instantaneous Forward Voltage<br>(Pulse Width = 300 $\mu\text{s}$ , Duty Cycle = 2%)                                                                       | $V_F$           | $I_F = 30\text{ A}$                                     | -   | -   | 1.0  | V                         |
|                                                                                                                                                            |                 | $I_F = 30\text{ A}, T_C = 150^\circ\text{C}$            | -   | -   | 0.85 | V                         |
| Instantaneous Reverse Current                                                                                                                              | $I_R$           | $V_R = 200\text{ V}$                                    | -   | -   | 250  | $\mu\text{A}$             |
|                                                                                                                                                            |                 | $V_R = 200\text{ V}, T_C = 150^\circ\text{C}$           | -   | -   | 1    | mA                        |
| Reverse Recovery Time (See Figure 6)<br>Summation of $t_a + t_b$                                                                                           | $t_{rr}$        | $I_F = 1\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$  | -   | -   | 45   | ns                        |
|                                                                                                                                                            |                 | $I_F = 30\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$ | -   | -   | 50   | ns                        |
| Time to Reach Peak Reverse Current<br>(See Figure 6)                                                                                                       | $t_a$           | $I_F = 30\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$ | -   | 20  | -    | ns                        |
| Time from Peak $I_{RM}$ to Projected Zero<br>Crossing of $I_{RM}$ Based on a Straight Line<br>from Peak $I_{RM}$ through 25% of $I_{RM}$<br>(See Figure 6) | $t_b$           | $I_F = 30\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$ | -   | 15  | -    | ns                        |
| Thermal Resistance Junction to Case                                                                                                                        | $R_{\theta JC}$ |                                                         | -   | -   | 1.2  | $^\circ\text{C}/\text{W}$ |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL PERFORMANCE CURVES

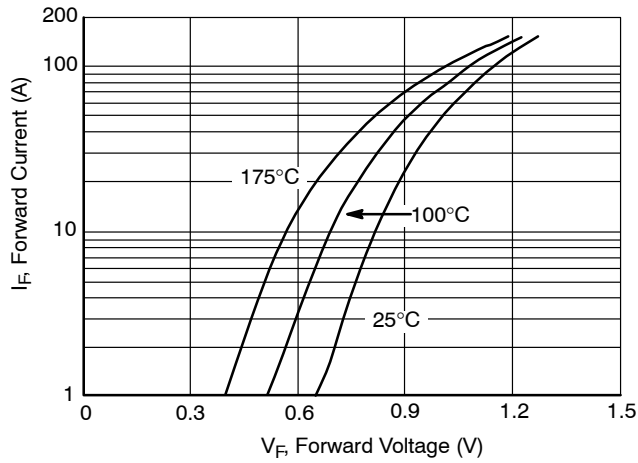


Figure 1. Forward Current vs. Forward Voltage

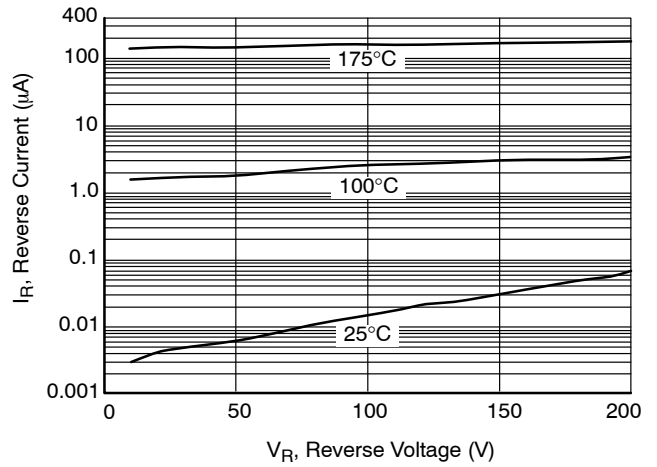


Figure 2. Reverse Current vs. Reverse Voltage

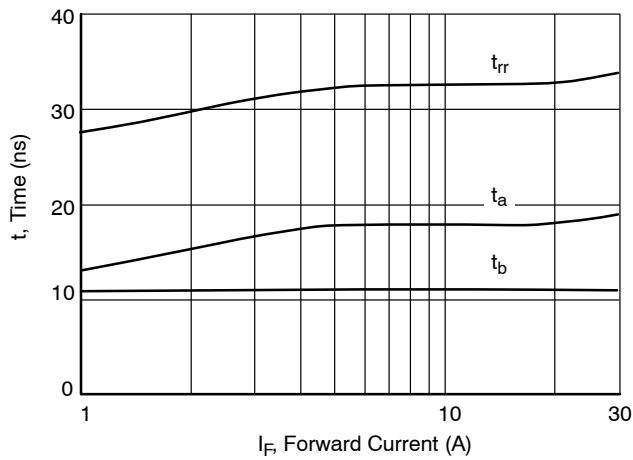


Figure 3.  $t_{tr}$ ,  $t_a$  and  $t_b$  Curves vs. Forward Current

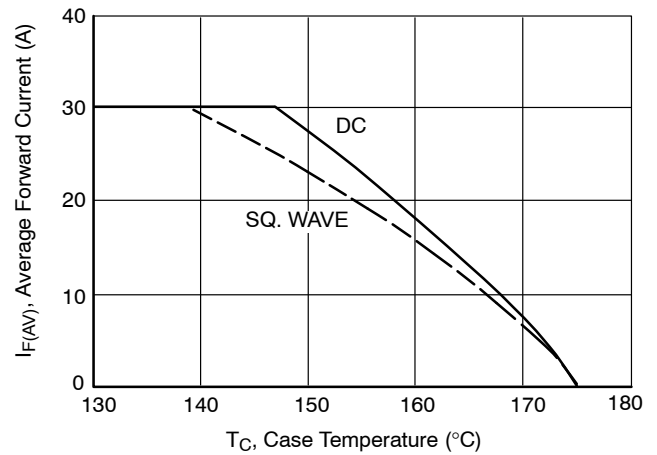


Figure 4. Current Derating Curve

TEST CIRCUITS AND WAVEFORMS

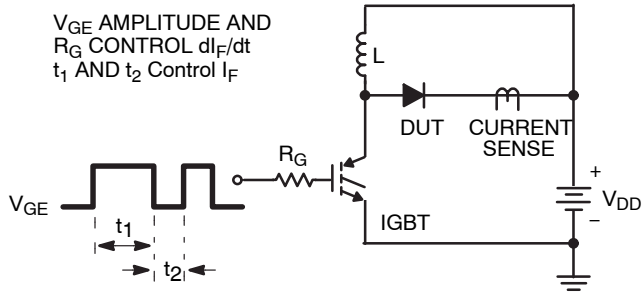


Figure 5.  $t_{rr}$  Test Circuit

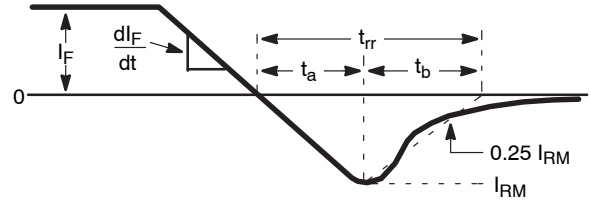


Figure 6.  $t_{rr}$  Waveforms and Definitions

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

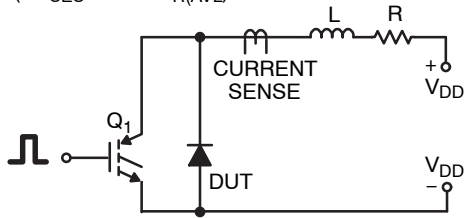


Figure 7. Avalanche Energy Test Circuit

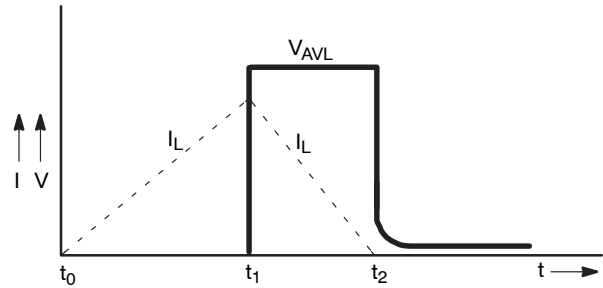
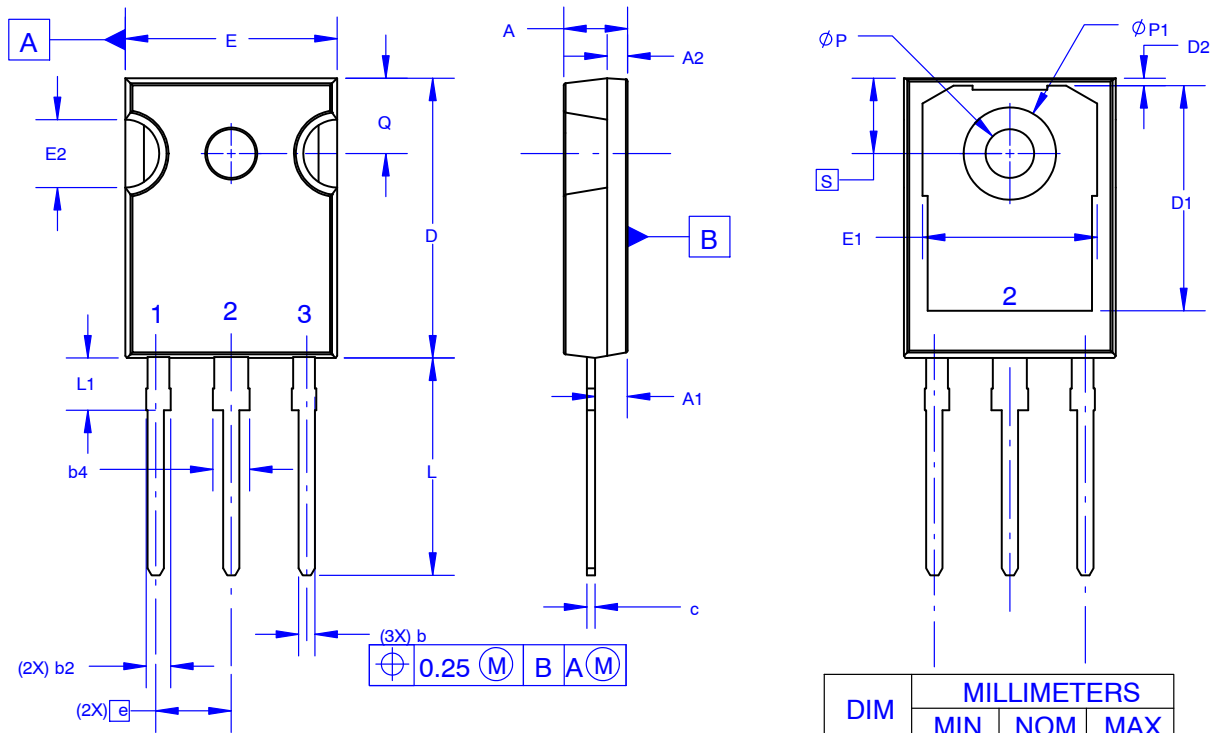


Figure 8. Avalanche Current and Voltage Waveforms

**TO-247-3LD SHORT LEAD**  
**CASE 340CK**  
**ISSUE A**

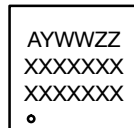
DATE 31 JAN 2019



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
- D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
- E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

**GENERIC MARKING DIAGRAM\***



- XXXX = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- ZZ = Assembly Lot Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

| DIM | MILLIMETERS |       |       |
|-----|-------------|-------|-------|
|     | MIN         | NOM   | MAX   |
| A   | 4.58        | 4.70  | 4.82  |
| A1  | 2.20        | 2.40  | 2.60  |
| A2  | 1.40        | 1.50  | 1.60  |
| b   | 1.17        | 1.26  | 1.35  |
| b2  | 1.53        | 1.65  | 1.77  |
| b4  | 2.42        | 2.54  | 2.66  |
| c   | 0.51        | 0.61  | 0.71  |
| D   | 20.32       | 20.57 | 20.82 |
| D1  | 13.08       | ~     | ~     |
| D2  | 0.51        | 0.93  | 1.35  |
| E   | 15.37       | 15.62 | 15.87 |
| E1  | 12.81       | ~     | ~     |
| E2  | 4.96        | 5.08  | 5.20  |
| e   | ~           | 5.56  | ~     |
| L   | 15.75       | 16.00 | 16.25 |
| L1  | 3.69        | 3.81  | 3.93  |
| ØP  | 3.51        | 3.58  | 3.65  |
| ØP1 | 6.60        | 6.80  | 7.00  |
| Q   | 5.34        | 5.46  | 5.58  |
| S   | 5.34        | 5.46  | 5.58  |

|                         |                              |                                                                                                                                                                                  |
|-------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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