Data Sheet | January 2000 | File Number 2773.4

## 30A, 200V Ultrafast Dual Diode

The RURH3020CC is an ultrafast dual diode ($t_{rr}$ < 45ns) with soft recovery characteristics. It has a low forward voltage drop and is of planar, silicon nitride passivated, ion-implanted, epitaxial construction.

This device is intended for use as an energy steering/ 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 minimize ringing and electrical noise in many power switching circuits thus reducing power loss in the switching transistor.

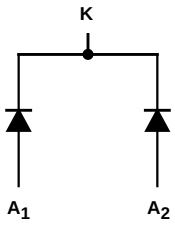
Formerly developmental type TA09645.

## Ordering Information

| PART NUMBER | PACKAGE | BRAND |
|---|---|---|
| RURH3020CC | TO-218AC | RURH3020C |

NOTE: When ordering, use the entire part number.

## Symbol




## Features

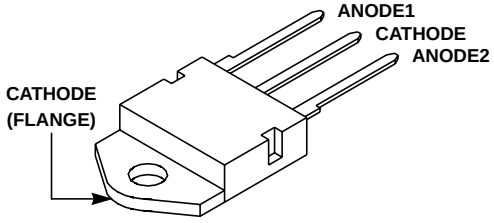
- Ultrafast with Soft Recovery . . . . . <45ns
- Operating Temperature. . . . . 175$^{o}$C
- Reverse Voltage . . . . . 200V
- Avalanche Energy Rated
- Planar Construction

## Applications

- Switching Power Supply
- Power Switching Circuits
- General Purpose

## Packaging

JEDEC TO-218AC




## Absolute Maximum Ratings

(Per Leg) $T_C = 25^{o}C$, Unless Otherwise Specified

| | | RURH3020CC | 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 ($T_C = 145^{o}C$) | $I_{F(AV)}$ | 30 | A |
| Repetitive Peak Surge Current (Square Wave 20kHz) | $I_{FRM}$ | 70 | A |
| Nonrepetitive Peak Surge Current (Halfwave 1 Phase 60Hz) | $I_{FSM}$ | 325 | A |
| Maximum Power Dissipation | $P_D$ | 125 | W |
| Avalanche Energy (See Figures 7 and 8) | $E_{AVL}$ | 20 | mJ |
| Operating and Storage Temperature | $T_{STG}$, $T_J$ | -55 to 175 | $^{o}$C |

## Electrical Specifications (Per Leg) $T_C = 25^oC$, Unless Otherwise Specified

| SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|
| $V_F$ | $I_F$ = 30A | - | - | 1.0 | V |
| | $I_F$ = 30A, $T_C = 150^oC$ | - | - | 0.85 | V |
| $I_R$ | $V_R$ = 200V | - | - | 250 | µA |
| | $V_R$ = 200V, $T_C = 150^oC$ | - | - | 1.0 | mA |
| $t_{rr}$ | $I_F$ = 1A, $dI_F/dt$ = 100A/µs | - | - | 45 | ns |
| | $I_F$ = 30A, $dI_F/dt$ = 100A/µs | - | - | 50 | ns |
| $t_a$ | $I_F$ = 30A, $dI_F/dt$ = 100A/µs | - | 28 | - | ns |
| $t_b$ | $I_F$ = 30A, $dI_F/dt$ = 100A/µs | - | 20 | - | ns |
| $R_{\theta JC}$ | | - | - | 1.2 | $^oC/W$ |

DEFINITIONS

$V_F$ = Instantaneous forward voltage (pw = 300µs, D = 2%).

$I_R$ = Instantaneous reverse current.

$t_{rr}$ = Reverse recovery time at $dI_F/dt$ = 100A/µs (See Figure 6), summation of $t_a + t_b$.

$t_a$ = Time to reach peak reverse current at $dI_F/dt$ = 100A/µs (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*

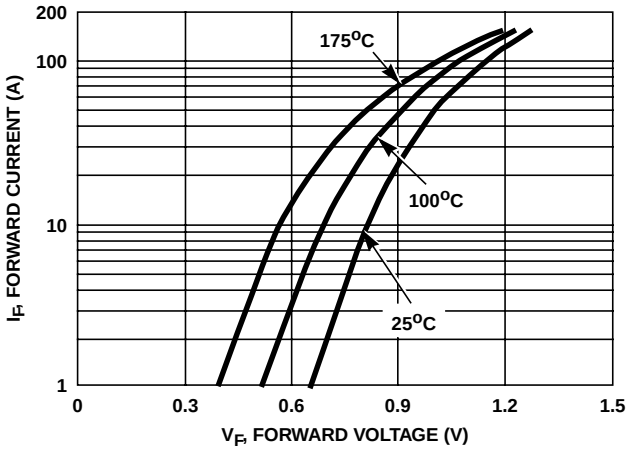



**FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE**

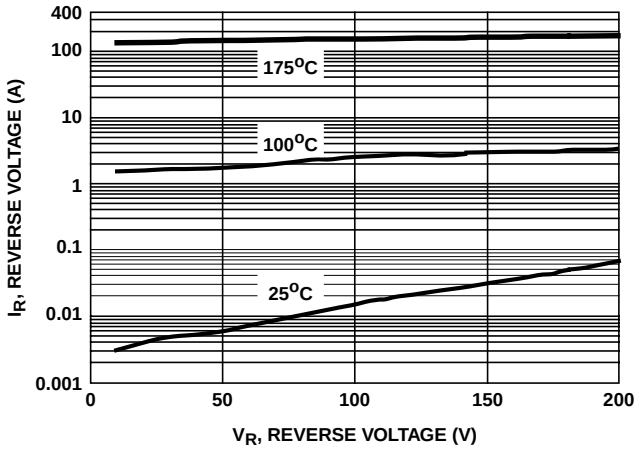



**FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE**

## Typical Performance Curves

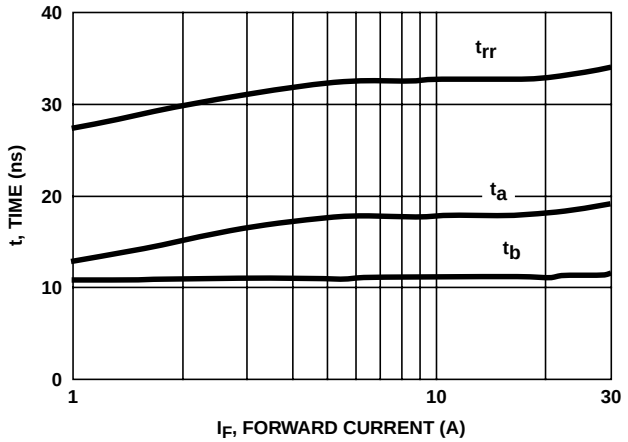



FIGURE 3. $t_{rr}$, $t_a$ AND $t_b$ CURVES vs FORWARD CURRENT

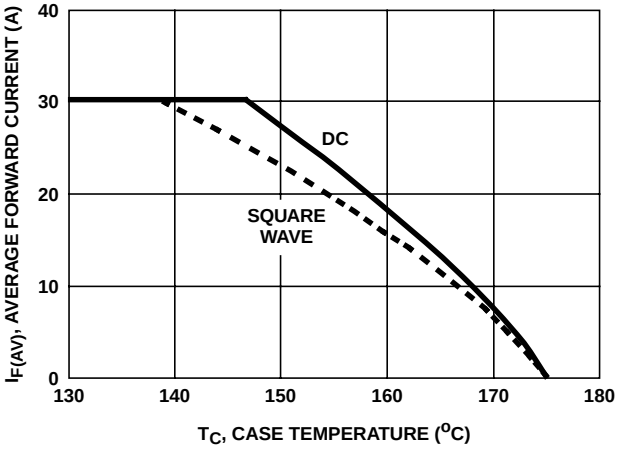



FIGURE 4. CURRENT DERATING CURVE

## Test Circuits and Waveforms

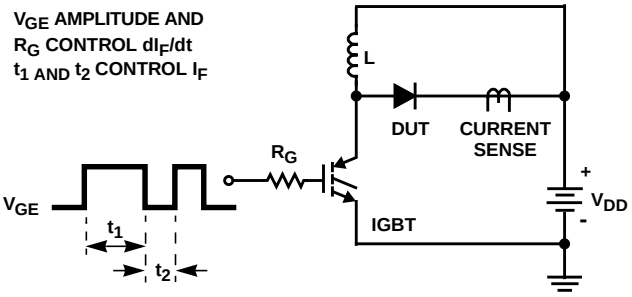



FIGURE 5. $t_{rr}$ TEST CIRCUIT

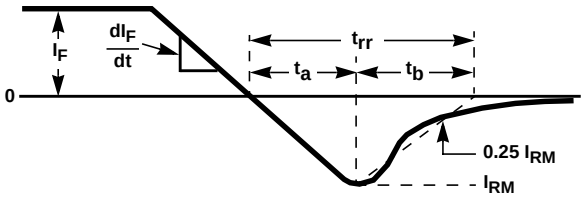



FIGURE 6. $t_{rr}$ WAVEFORMS AND DEFINITIONS

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

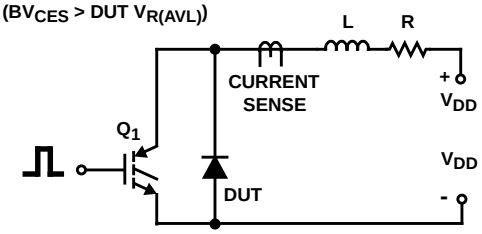



FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

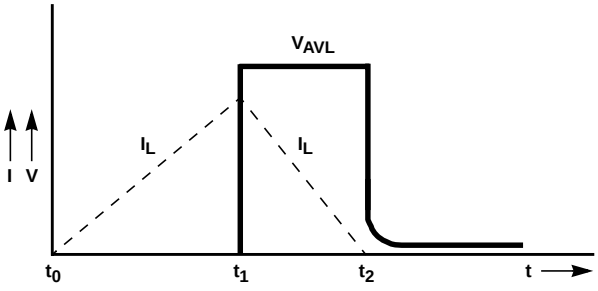



FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS