Data Sheet | January 2000 | File Number 3974.1

## 8A, 400V - 600V Ultrafast Dual Diodes

The RURP840CC and RURP860CC are ultrafast dual diodes with soft recovery characteristics ($t_{rr}$ < 60ns). They have low forward voltage drop and are silicon nitride passivated ion-implanted epitaxial planar construction.

These devices are intended for use as freewheeling/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast soft recovery minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

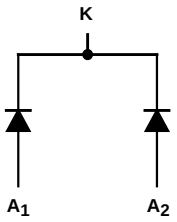
Formerly developmental type TA09616.

## Ordering Information

| PART NUMBER | PACKAGE | BRAND |
|---|---|---|
| RURP840CC | TO-220AB | RURP840C |
| RURP860CC | TO-220AB | RURP860C |

NOTE: When ordering, use the entire part number.

## Symbol




## Features

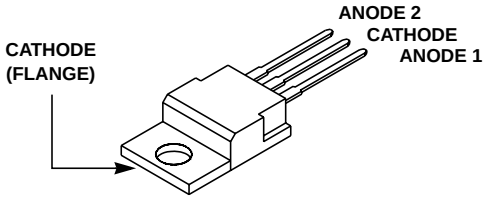
- Ultrafast with Soft Recovery . . . . . <60ns
- Operating Temperature. . . . . 175$^{o}$C
- Reverse Voltage . . . . . 600V
- Avalanche Energy Rated
- Planar Construction

## Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

## Packaging

JEDEC TO-220AB




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

| | | RURP840CC | RURP860CC | UNITS |
|---|---|---|---|---|
| Peak Repetitive Reverse Voltage | $V_{RRM}$ | 400 | 600 | V |
| Working Peak Reverse Voltage | $V_{RWM}$ | 400 | 600 | V |
| DC Blocking Voltage | $V_R$ | 400 | 600 | V |
| Average Rectified Forward Current ($T_C$ = 155$^{o}$C) | $I_{F(AV)}$ | 8 | 8 | A |
| Repetitive Peak Surge Current (Square Wave, 20kHz) | $I_{FRM}$ | 16 | 16 | A |
| Nonrepetitive Peak Surge Current (Halfwave, 1 phase, 60Hz) | $I_{FSM}$ | 100 | 100 | A |
| Maximum Power Dissipation | $P_D$ | 75 | 75 | W |
| Avalanche Energy (See Figures 10 and 11) | $E_{AVL}$ | 20 | 20 | mJ |
| Operating and Storage Temperature | $T_{STG}$, $T_J$ | -65 to 175 | -65 to 175 | $^{o}$C |



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

| SYMBOL | TEST CONDITION | RURP840CC | | | RURP860CC | | | UNITS |
|---|---|---|---|---|---|---|---|---|
| | | MIN | TYP | MAX | MIN | TYP | MAX | |
| $V_F$ | $I_F$ = 8A | - | - | 1.3 | - | - | 1.5 | V |
| | $I_F$ = 8A, $T_C = 150^oC$ | - | - | 1.0 | - | - | 1.2 | V |
| $I_R$ | $V_R$ = 400V | - | - | 100 | - | - | - | µA |
| | $V_R$ = 600V | - | - | - | - | - | 100 | µA |
| | $V_R$ = 400V, $T_C = 150^oC$ | - | - | 500 | - | - | - | µA |
| | $V_R$ = 600V, $T_C = 150^oC$ | - | - | - | - | - | 500 | µA |
| $t_{rr}$ | $I_F$ = 1A, $dI_F/dt$ = 200A/µs | - | - | 60 | - | - | 60 | ns |
| | $I_F$ = 8A, $dI_F/dt$ = 200A/µs | - | - | 70 | - | - | 70 | ns |
| $t_a$ | $I_F$ = 8A, $dI_F/dt$ = 200A/µs | - | 32 | - | - | 32 | - | ns |
| $t_b$ | $I_F$ = 8A, $dI_F/dt$ = 200A/µs | - | 21 | - | - | 21 | - | ns |
| $Q_{RR}$ | $I_F$ = 8A, $dI_F/dt$ = 200A/µs | - | 195 | - | - | 195 | - | nC |
| $C_J$ | $V_R$ = 10V, $I_F$ = 0A | - | 25 | - | - | 25 | - | pF |
| $R_{\theta JC}$ | | - | - | 2 | - | - | 2 | $^oC/W$ |

DEFINITIONS

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

$I_R$ = Instantaneous reverse current.

$t_{rr}$ = Reverse recovery time (See Figure 9), summation of $t_a + t_b$.

$t_a$ = Time to reach peak reverse current (See Figure 9).

$t_b$ = 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 9).

$Q_{RR}$ = Reverse recovery charge.

$C_J$ = Junction Capacitance.

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

pw = pulse width.

D = duty cycle.

## Typical Performance Curves

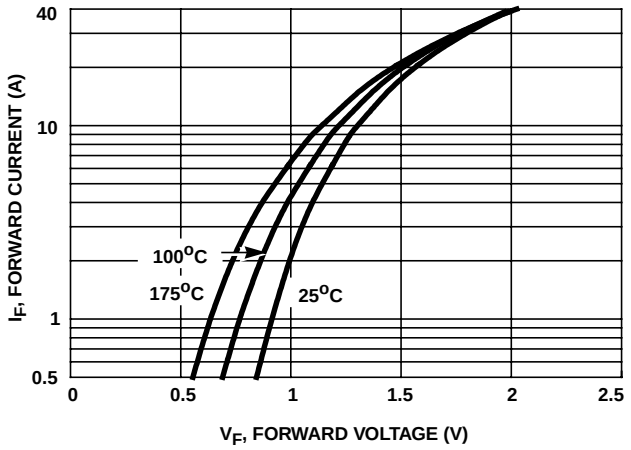



FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

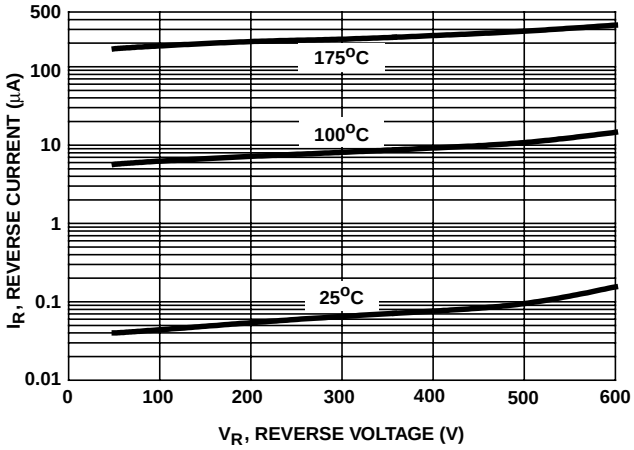



FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

## Typical Performance Curves (Continued)

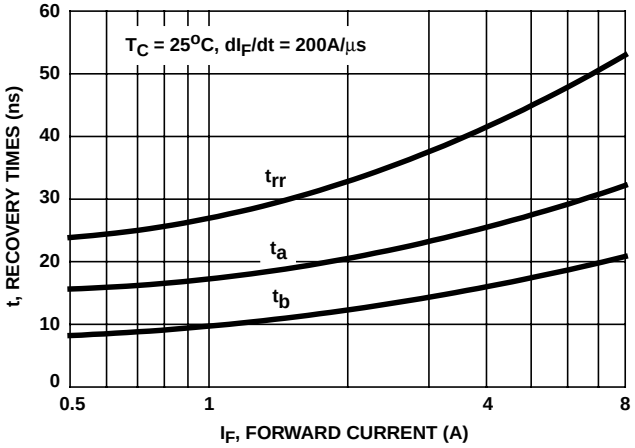



FIGURE 3. $t_{rr}$, $t_a$ AND $t_b$ CURVES vs FORWARD CURRENT

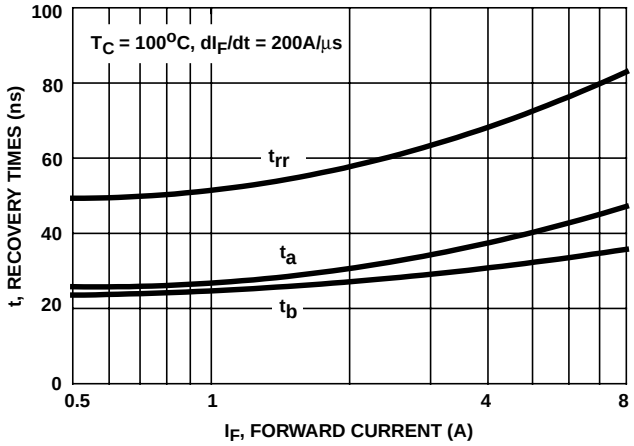



FIGURE 4. $t_{rr}$, $t_a$ AND $t_b$ CURVES vs FORWARD CURRENT

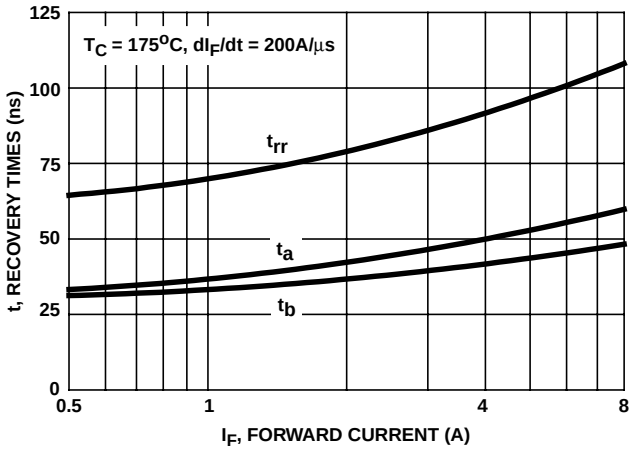



FIGURE 5. $t_{rr}$, $t_a$ AND $t_b$ CURVES vs FORWARD CURRENT

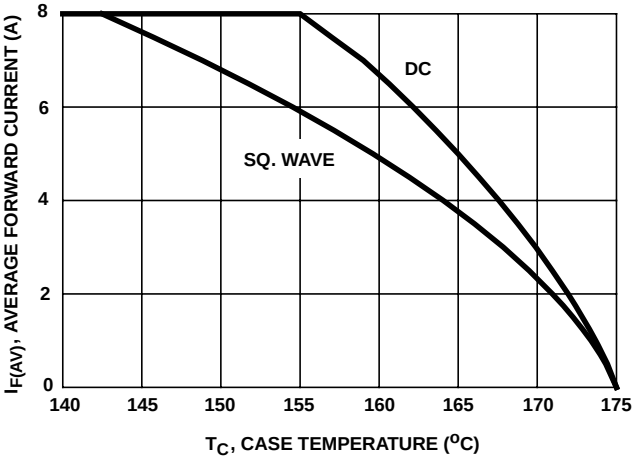



FIGURE 6. CURRENT DERATING CURVE

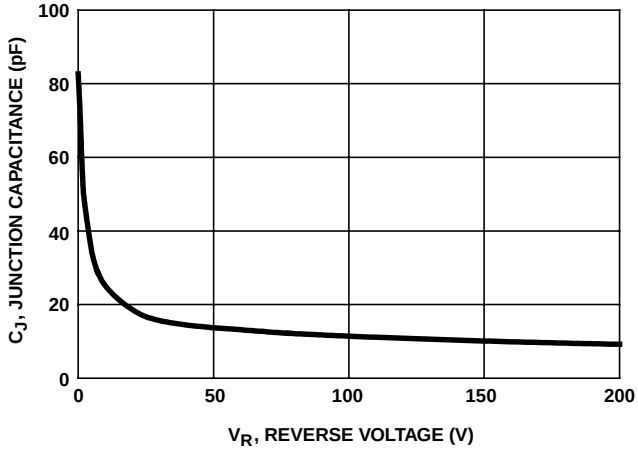



FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

## Test Circuits and Waveforms

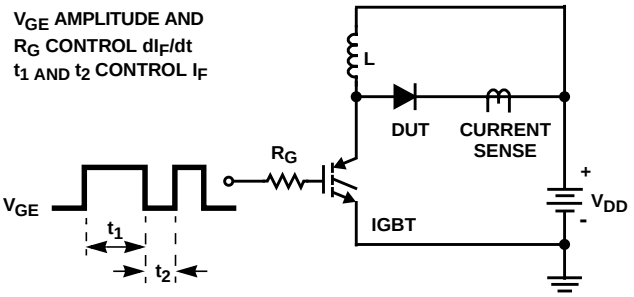



FIGURE 8. $t_{rr}$ TEST CIRCUIT

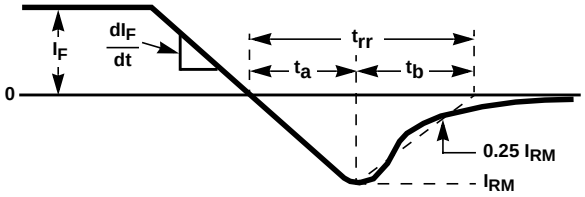



FIGURE 9. $t_{rr}$ WAVEFORMS AND DEFINITIONS

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 $V_{R(AVL)}$)

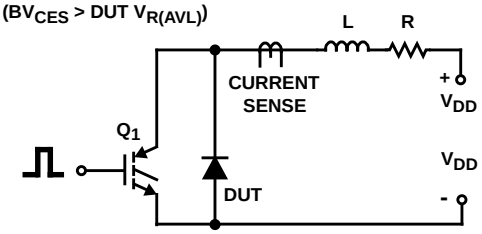



FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

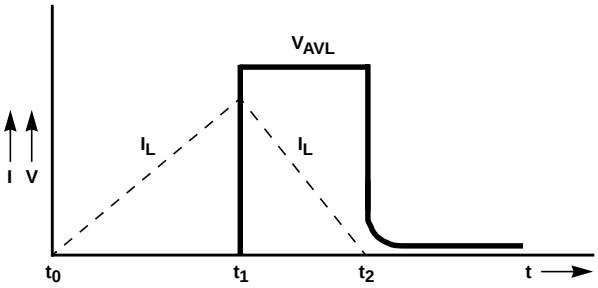



FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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