

April 1995

30A, 400V - 600V Ultrafast Dual Diodes

### Features

- Ultrafast with Soft Recovery Characteristic ( $t_{RR} < 55\text{ns}$ )
- +175°C Rated Junction Temperature
- Reverse Voltage Up to 600V
- Avalanche Energy Rated

### Applications

- Switching Power Supply
- Power Switching Circuits
- General Purpose

### Description

RURH3040CC, RURH3050CC, RURH3060CC are ultrafast dual diodes ( $t_{RR} < 55\text{ns}$ ) with soft recovery characteristics. They have a low forward voltage drop and are of planar, silicon nitride passivated, ion-implanted, epitaxial construction.

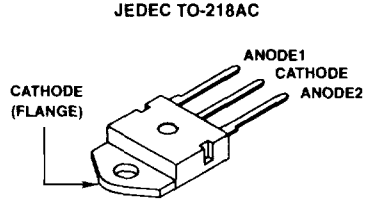
These devices are intended for use as energy steering/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast recovery with soft recovery characteristics minimizes ringing and electrical noise in many power switching circuits thus reducing power loss in the switching transistor.

#### PACKAGING AVAILABILITY

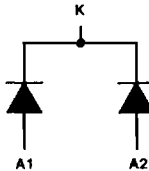
PART NUMBER	PACKAGE	BRAND
RURH3040CC	TO-218AC	RURH3040C
RURH3050CC	TO-218AC	RURH3050C
RURH3060CC	TO-218AC	RURH3060C

NOTE: When ordering, use the entire part number.

### Package



### Symbol



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

	RURH3040CC	RURH3050CC	RURH3060CC
Peak Repetitive Reverse Voltage..... $V_{RRM}$	400V	500V	600V
Working Peak Reverse Voltage..... $V_{RWM}$	400V	500V	600V
DC Blocking Voltage..... $V_R$	400V	500V	600V
Average Rectified Forward Current (Per Leg)..... $I_{F(AV)}$ (Total device forward current at rated $V_R$ and $T_C = +150^\circ\text{C}$ )	30A	30A	30A
Peak Forward Repetitive Current..... $I_{FRM}$ (Rated $V_R$ , square wave 20kHz)	70A	70A	70A
Nonrepetitive Peak Surge Current..... $I_{FSM}$ (Surge applied at rated load condition halfwave 1 phase 60Hz)	325A	325A	325A
Operating and Storage Temperature..... $T_{STG}, T_J$	-55°C to +175°C	-55°C to +175°C	-55°C to +175°C

## Specifications RURH3040CC, RURH3050CC, RURH3060CC

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

SYMBOL	TEST CONDITION	LIMITS									UNITS
		RURH3040CC			RURH3050CC			RURH3060CC			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
$V_F$	$I_F = 30\text{A}$ $T_C = +150^\circ\text{C}$	-	-	1.30	-	-	1.30	-	-	1.30	V
	$I_F = 30\text{A}$ $T_C = +25^\circ\text{C}$	-	-	1.50	-	-	1.50	-	-	1.50	V
$I_R$ at $T_C = +25^\circ\text{C}$	$V_R = 400\text{V}$	-	-	500	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 500\text{V}$	-	-	-	-	-	500	-	-	-	$\mu\text{A}$
	$V_R = 600\text{V}$	-	-	-	-	-	-	-	-	500	$\mu\text{A}$
$I_R$ at $T_C = +150^\circ\text{C}$	$V_R = 400\text{V}$	-	-	1	-	-	-	-	-	-	mA
	$V_R = 500\text{V}$	-	-	-	-	-	1	-	-	-	mA
	$V_R = 600\text{V}$	-	-	-	-	-	-	-	-	1	mA
$t_{RR}$	$I_F = 1\text{A}$	-	-	55	-	-	55	-	-	55	ns
	$I_F = 30\text{A}$	-	-	60	-	-	60	-	-	60	ns
$t_A$	$I_F = 1\text{A}$	-	20	-	-	20	-	-	20	-	ns
	$I_F = 30\text{A}$	-	38	-	-	38	-	-	38	-	ns
$t_B$	$I_F = 1\text{A}$	-	15	-	-	15	-	-	15	-	ns
	$I_F = 30\text{A}$	-	20	-	-	20	-	-	20	-	ns
$R_{\theta\text{JC}}$		-	-	1.2	-	-	1.2	-	-	1.2	$^\circ\text{C/W}$
$E_{\text{AVL}}$	see Fig. 7 and 8	-	-	20	-	-	20	-	-	20	mJ

### 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 2), 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 2).
- $t_B$  = 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 2).
- $R_{\theta\text{JC}}$  = Thermal resistance junction to case.
- $E_{\text{AVL}}$  = Controlled avalanche energy (See Figures 7 and 8).
- $p_w$  = pulse width.
- $D$  = duty cycle.

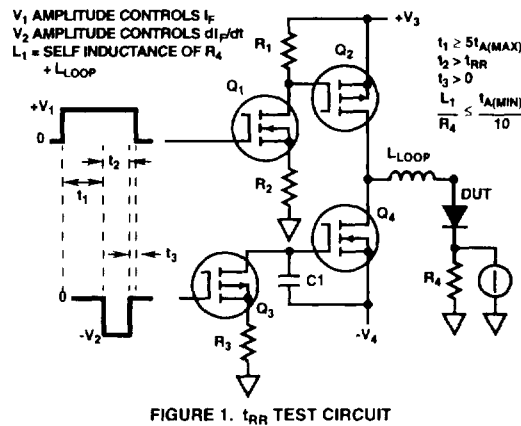


FIGURE 1.  $t_{RR}$  TEST CIRCUIT

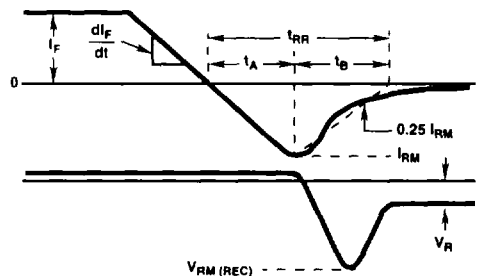


FIGURE 2. DEFINITIONS OF  $t_{RR}$ ,  $t_A$  AND  $t_B$

Typical Performance Curves

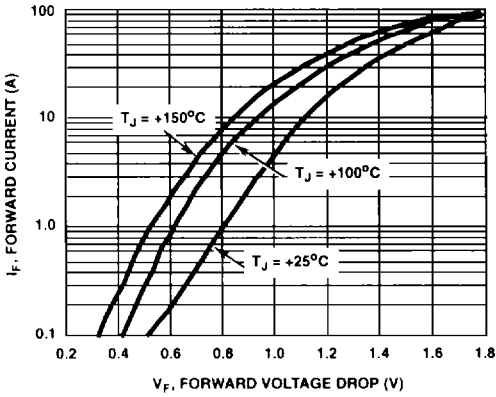


FIGURE 3. FORWARD VOLTAGE vs FORWARD CURRENT CHARACTERISTIC

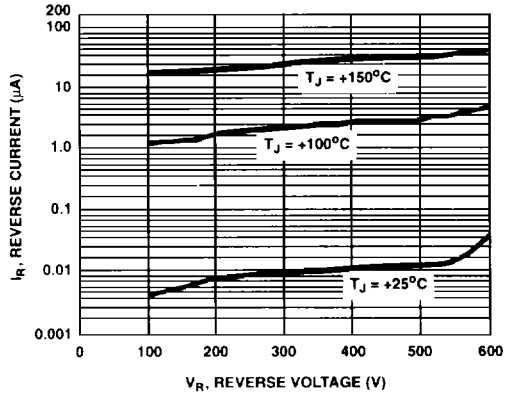


FIGURE 4. REVERSE VOLTAGE vs REVERSE CURRENT CHARACTERISTIC

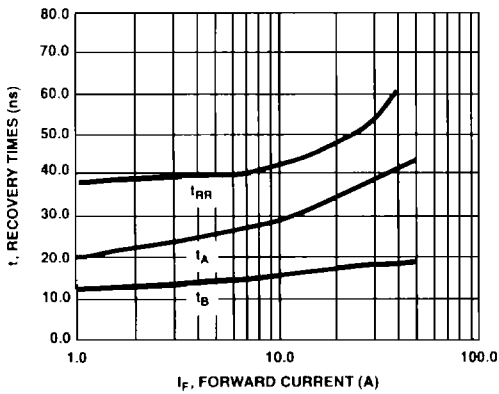


FIGURE 5. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT

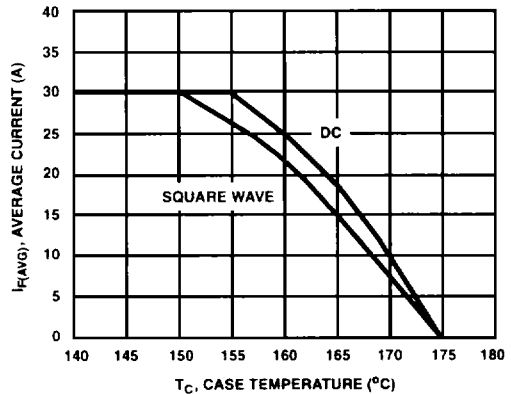


FIGURE 6. TYPICAL CURRENT DERATING CURVE vs CASE TEMPERATURE

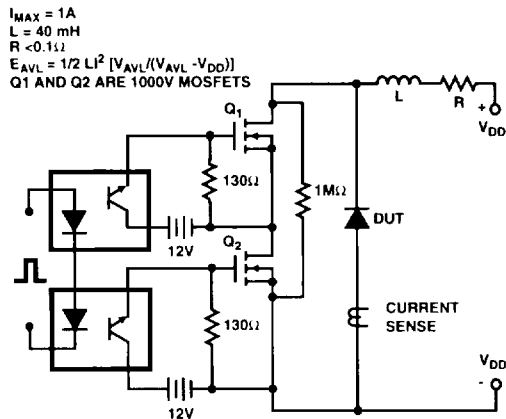


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

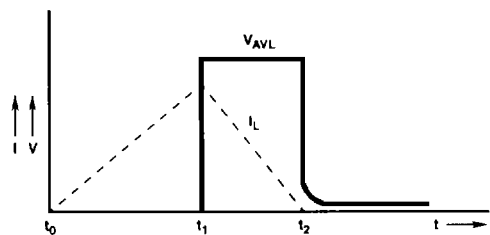


FIGURE 8. CURRENT VOLTAGE WAVEFORM

6  
ULTRAFAST  
DUAL DIODES