

April 1995

50A, 1200V Ultrafast Diode

**Features**

- Ultrafast with Soft Recovery . . . . . < 125ns
- Operating Temperature . . . . . +175°C
- Reverse Voltage . . . . . 1200V
- Avalanche Energy Rated
- Planar Construction

**Applications**

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

**Description**

The RURU50120 (TA49099) are ultrafast diodes with soft recovery characteristics ( $t_{RR} < 125ns$ ). 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.

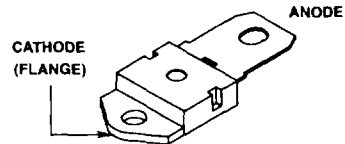
**PACKAGING AVAILABILITY**

PART NUMBER	PACKAGE	BRAND
RURU50120	TO-218	RURU50120

NOTE: When ordering, use the entire part number.

**Package**

SINGLE LEAD JEDEC STYLE TO-218



**Symbol**



**Absolute Maximum Ratings**  $T_C = +25^\circ C$ , Unless Otherwise Specified

	RURU50120	UNITS
Peak Repetitive Reverse Voltage . . . . . $V_{RRM}$	1200	V
Working Peak Reverse Voltage . . . . . $V_{RWM}$	1200	V
DC Blocking Voltage . . . . . $V_R$	1200	V
Average Rectified Forward Current . . . . . $I_{F(AV)}$ ( $T_C = +85^\circ C$ )	50	A
Repetitive Peak Surge Current . . . . . $I_{FSM}$ (Square Wave, 20kHz)	100	A
Nonrepetitive Peak Surge Current . . . . . $I_{FSM}$ (Halfwave, 1 Phase, 60Hz)	500	A
Maximum Power Dissipation . . . . . $P_D$	170	W
Avalanche Energy ( $L = 40mH$ ) . . . . . $E_{AVL}$	50	mJ
Operating and Storage Temperature . . . . . $T_{STG}, T_J$	-65 to +175	$^\circ C$

**5**  
ULTRAFAST  
SINGLE DIODES

## Specifications RURU50120

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
$V_F$	$I_F = 50\text{A}$ , $T_C = +25^\circ\text{C}$	-	-	2.1	V
	$I_F = 50\text{A}$ , $T_C = +150^\circ\text{C}$	-	-	1.9	V
$I_R$	$V_R = 1200\text{V}$ , $T_C = +25^\circ\text{C}$	-	-	500	$\mu\text{A}$
	$V_R = 1200\text{V}$ , $T_C = +150^\circ\text{C}$	-	-	2.0	$\text{mA}$
$t_{RR}$	$I_F = 1\text{A}$ , $di_F/dt = 100\text{A}/\mu\text{s}$	-	-	125	ns
	$I_F = 50\text{A}$ , $di_F/dt = 100\text{A}/\mu\text{s}$	-	-	200	ns
$t_A$	$I_F = 50\text{A}$ , $di_F/dt = 100\text{A}/\mu\text{s}$	-	95	-	ns
$t_B$	$I_F = 50\text{A}$ , $di_F/dt = 100\text{A}/\mu\text{s}$	-	70	-	ns
$Q_{RR}$	$I_F = 50\text{A}$ , $di_F/dt = 100\text{A}/\mu\text{s}$	-	800	-	nC
$C_J$	$V_R = 10\text{V}$ , $I_F = 0\text{A}$	-	160	-	pF
$R_{thJC}$		-	-	0.9	$^\circ\text{C}/\text{W}$

#### DEFINITIONS

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

$I_R$  = Instantaneous reverse current.

$t_{RR}$  = Reverse recovery time (See Figure 2), summation of  $t_A + t_B$ .

$t_A$  = Time to reach peak reverse current (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).

$R_{thJC}$  = Thermal resistance junction to case.

$E_{AVL}$  = Controlled avalanche energy (See Figures 10 and 11).

$p_w$  = pulse width.

$D$  = duty cycle.

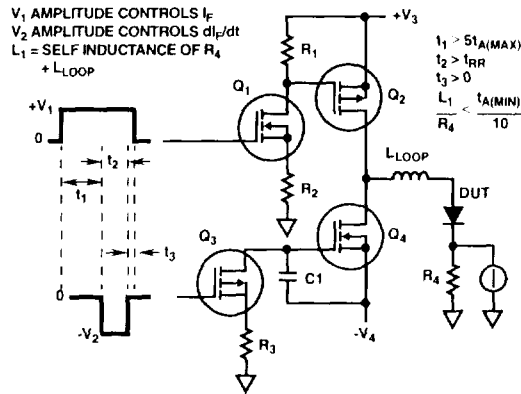


FIGURE 1.  $t_{RR}$  TEST CIRCUIT

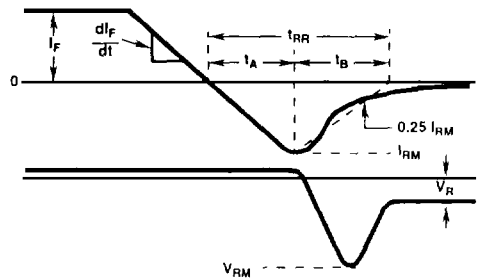


FIGURE 2.  $t_{RR}$  WAVEFORMS AND DEFINITIONS

Typical Performance Curves

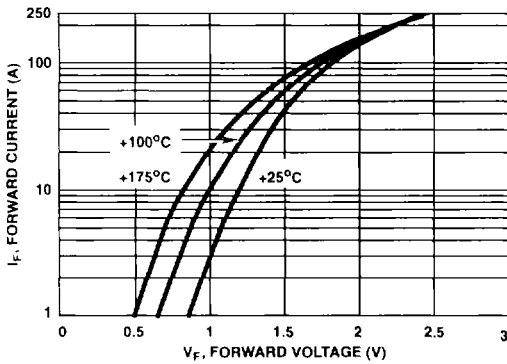


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

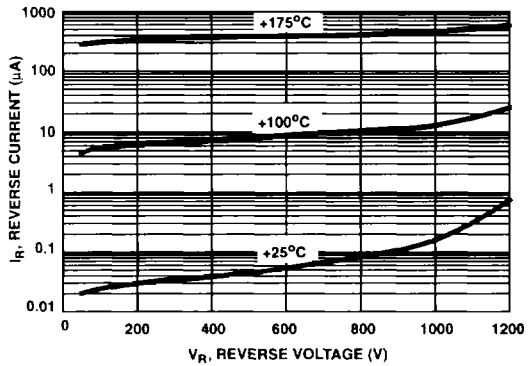


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

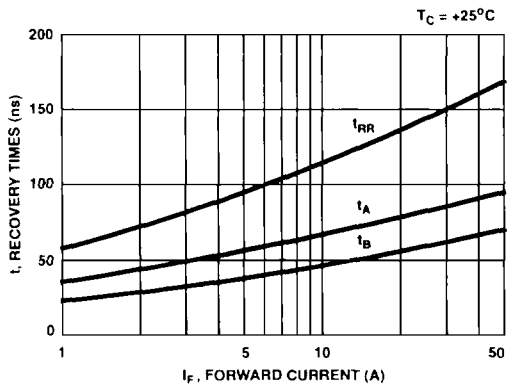


FIGURE 5. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT AT +25°C

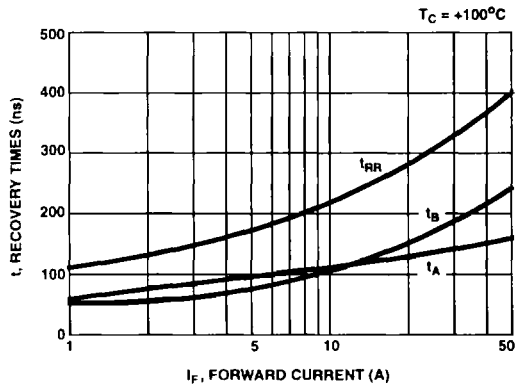


FIGURE 6. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT AT +100°C

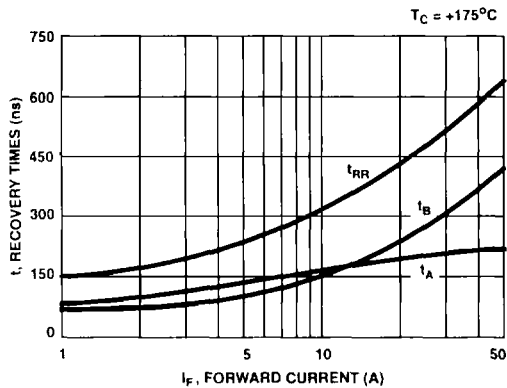


FIGURE 7. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT AT +175°C

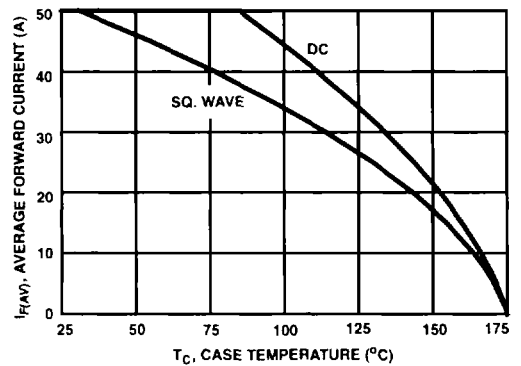


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

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ULTRAFAST  
SINGLE DIODES

Typical Performance Curves (Continued)

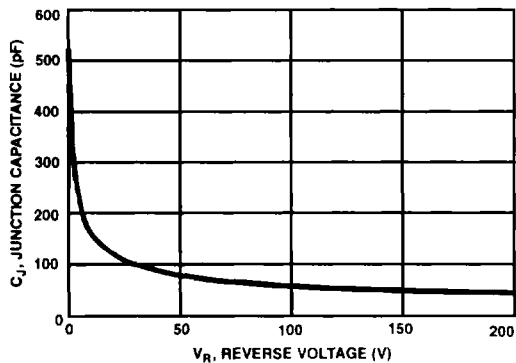


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

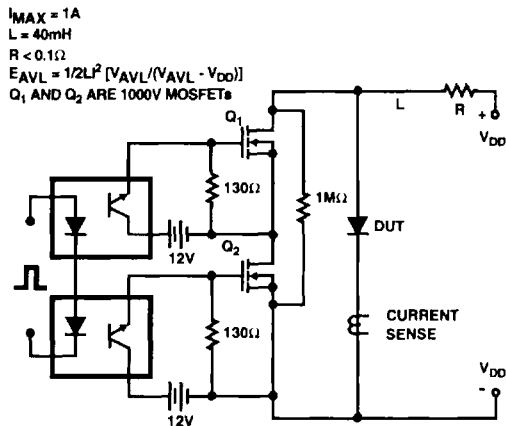


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

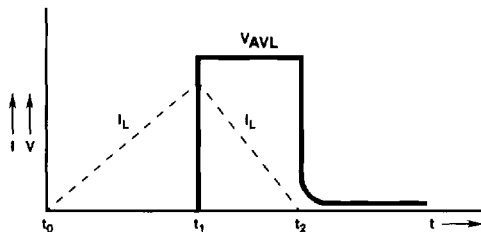


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS