



# RUR30120

February 1993

## 30A, 1200V Ultrafast Diode

### Features

- Ultrafast with Soft Recovery.....<110ns
- Operating Temperature.....175°C
- Reverse Voltage Up To.....1200V
- Avalanche Energy Rated
- Planar Construction

### Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

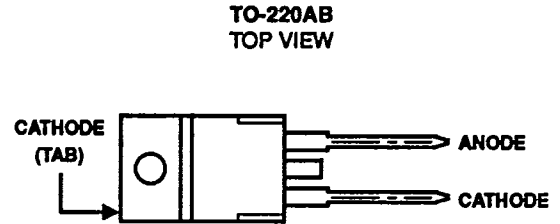
### Description

The RUR30120 (49031) is an ultrafast diode with soft recovery characteristic ( $t_{RR} < 110ns$ ). It has low forward voltage drop and is silicon nitride passivated ion-implanted epitaxial planar construction.

This device is intended for use as a freewheeling/ 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 characteristic minimize ringing and electrical noise in many power switching circuits, reducing power loss in the switching transistors.

The RUR30120 is supplied in the two lead, TO-220AB style plastic package.

### Package



### Symbol



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

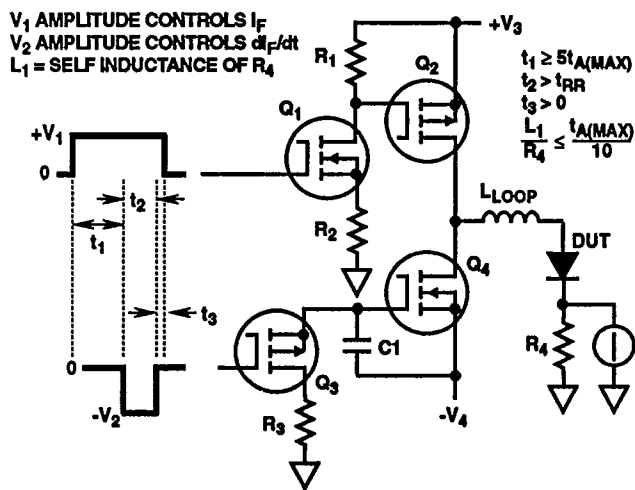
	RUR30120	UNITS
Peak Repetitive Reverse Voltage..... $V_{RRM}$	1200	V
Working Peak Reverse Voltage..... $V_{RWM}$	1200	V
DC Blocking Voltage..... $V_R$	1200	V
Average Rectified Forward Current..... $I_{F(AV)}$ ( $T_C = +110^\circ C$ )	30	A
Repetitive Peak Surge Current..... $I_{FSM}$ (Square Wave, 20kHz)	60	A
Nonrepetitive Peak Surge Current..... $I_{FSM}$ (Halfwave, 1 phase, 60Hz)	300	A
Maximum Power Dissipation..... $P_D$	125	W
Avalanche Energy ( $L = 40mH$ )..... $W_{AVL}$	30	mJ
Operating and Storage Temperature..... $T_{STG}, T_J$	-65 to +175	°C

**Electrical Characteristics** Case Temperature ( $T_C$ ) = +25°C, Unless Otherwise Specified

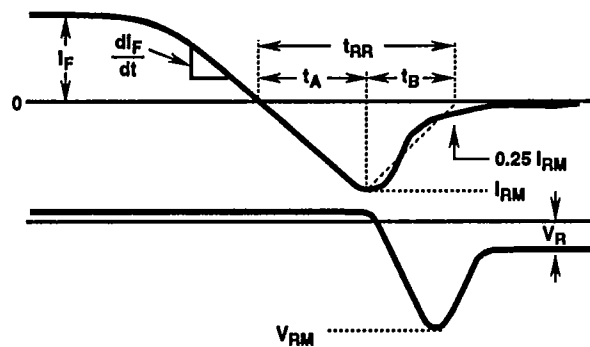
SYMBOL	TEST CONDITION	LIMITS			UNITS
		MIN	TYP	MAX	
$V_F$	$I_F = 30A$	-	-	2.1	V
$V_F$	$I_F = 30A, T_C = 150^\circ C$	-	-	1.9	V
$I_R$	$V_R = 1200V$	-	-	100	$\mu A$
$I_R$	$V_R = 1200V, T_C = 150^\circ C$	-	-	1	mA
$t_{RR}$	$I_F = 1A, dI_F/dt = 100A/\mu s$	-	-	110	ns
	$I_F = 30A, dI_F/dt = 100A/\mu s$	-	-	150	ns
$t_A$	$I_F = 30A, dI_F/dt = 100A/\mu s$	-	90	-	ns
$t_B$	$I_F = 30A, dI_F/dt = 100A/\mu s$	-	45	-	ns
$R_{\theta JC}$		-	-	1.2	$^\circ C/W$

**DEFINITIONS**

- $V_F$  = Instantaneous forward voltage (pw = 300 $\mu s$ , D = 2%).
- $I_R$  = Instantaneous reverse current (pw = 300 $\mu s$ , D = 2%).
- $t_{RR}$  = 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).
- $R_{\theta JC}$  = Thermal resistance junction to case.
- pw = pulse width.
- D = duty cycle.



**FIGURE 1.  $t_{RR}$  TEST CIRCUIT**



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

RUR30120

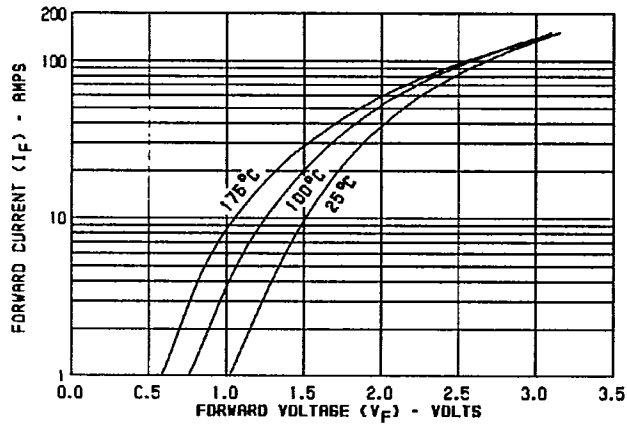


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

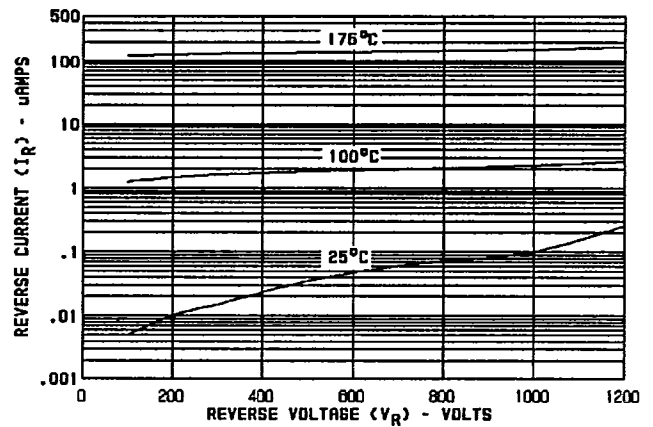


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

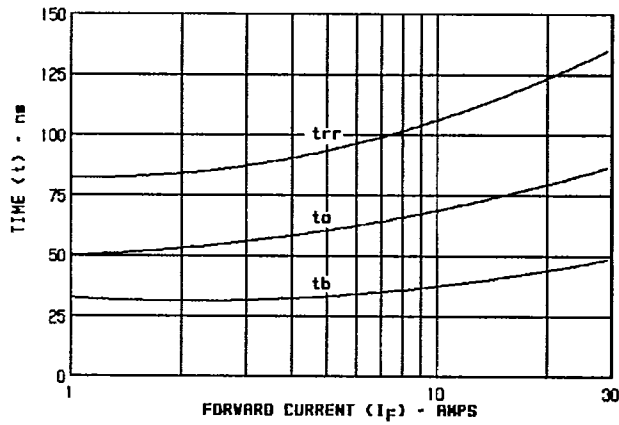


FIGURE 5. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT

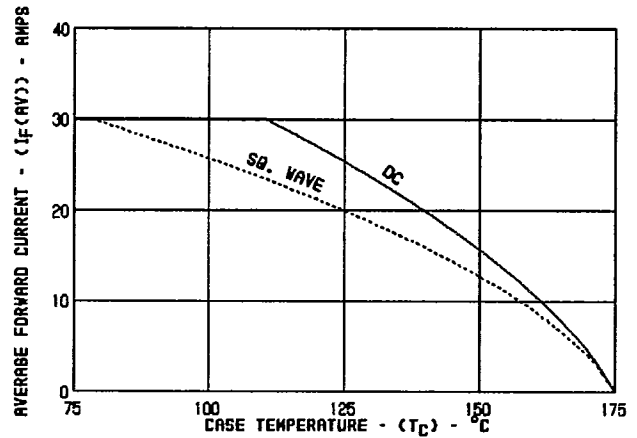


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

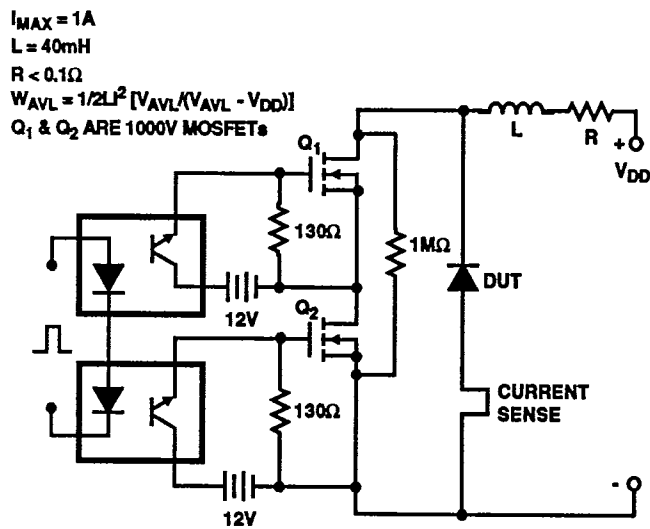


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

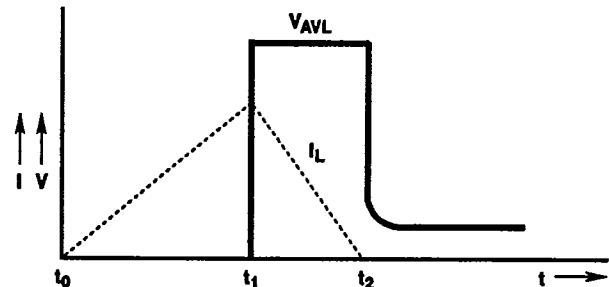
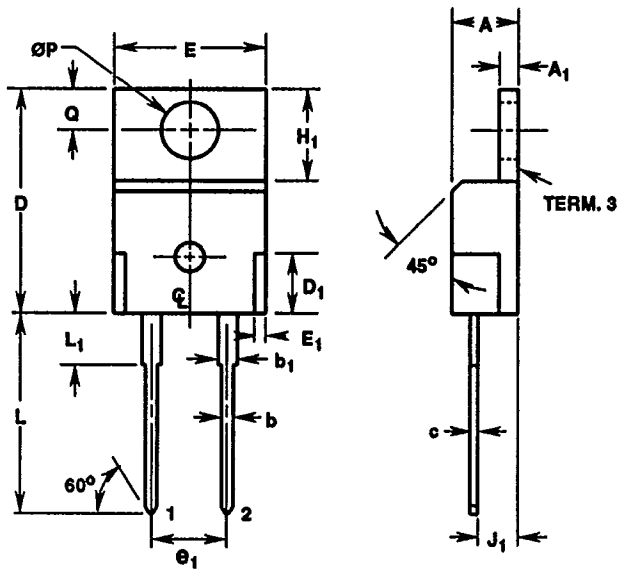


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

**Packaging**

**TO-220AB STYLE PLASTIC PACKAGE**



**TO-220AB**

**2 LEAD STYLE PLASTIC PACKAGE**

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.170	0.180	4.32	4.57	-
A <sub>1</sub>	0.048	0.052	1.22	1.32	-
b	0.030	0.034	0.77	0.86	3, 4
b <sub>1</sub>	0.045	0.055	1.15	1.39	2, 3
c	0.014	0.017	0.36	0.43	2, 3, 4
D	0.590	0.610	14.99	15.49	-
D <sub>1</sub>	-	0.160	-	4.06	-
E	0.395	0.410	10.04	10.41	-
E <sub>1</sub>	-	0.030	-	0.76	-
e <sub>1</sub>	0.200 BSC		5.08 BSC		5
H <sub>1</sub>	0.235	0.255	5.97	6.47	-
J <sub>1</sub>	0.100	0.110	2.54	2.79	6
L	0.530	0.550	13.47	13.97	-
L <sub>1</sub>	0.130	0.150	3.31	3.81	2
ØP	0.149	0.153	3.79	3.88	-
Q	0.102	0.112	2.60	2.84	-

**NOTES:**

1. These dimensions are within allowable dimensions of Rev. J of JEDEC TO-220AB outline dated 3-24-87.
2. Lead dimension and finish uncontrolled in L<sub>1</sub>.
3. Lead dimension (without solder).
4. Add typically 0.002 inch (0.05mm) for solder coating.
5. Position of lead to be measured 0.250 inch (6.35mm) from bottom of dimension D.
6. Position of lead to be measured 0.100 inch (2.54mm) from bottom of dimension D.
7. Controlling dimension: Inch.
8. Revision 1 dated 1-93.

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