HARRIS SEMICONDUCTOR

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

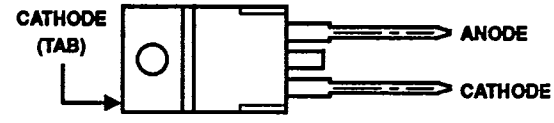
The RUR30120 (49031) is an ultrafast diode with soft recovery characteristic (t_{RR} < 110ns). It has low forward voltage drop and is silicon nitride passivated ion-implanted epitaxial planar construction.

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

TO-220AB
TOP VIEW



Symbol

Absolute Maximum Ratings (T_C = +25°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 (T_C = +110°C)	$I_{F(AV)}$	30	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	60	A
Nonrepetitive Peak Surge Current (Halfwave, 1 phase, 60Hz)	I_{FSM}	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

CAUTION: These devices are sensitive to electrostatic discharge. Users should follow proper I.C. Handling Procedures.

File Number 3397

Specifications RUR30120

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°C	-	-	1.9	V
I_R	V_R = 1200V	-	-	100	µA
I_R	V_R = 1200V, T_C = 150°C	-	-	1	mA
t_{RR}	I_F = 1A, dI_F/dt = 100A/µs	-	-	110	ns
	I_F = 30A, dI_F/dt = 100A/µs	-	-	150	ns
t_A	I_F = 30A, dI_F/dt = 100A/µs	-	90	-	ns
t_B	I_F = 30A, dI_F/dt = 100A/µs	-	45	-	ns
$R_{\theta JC}$		-	-	1.2	°C/W

DEFINITIONS

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

I_R = Instantaneous reverse current (pw = 300µs, 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.

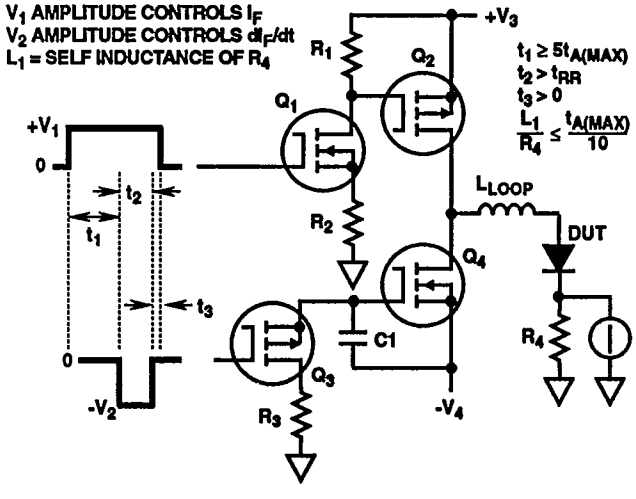


FIGURE 1. t_{RR} TEST CIRCUIT

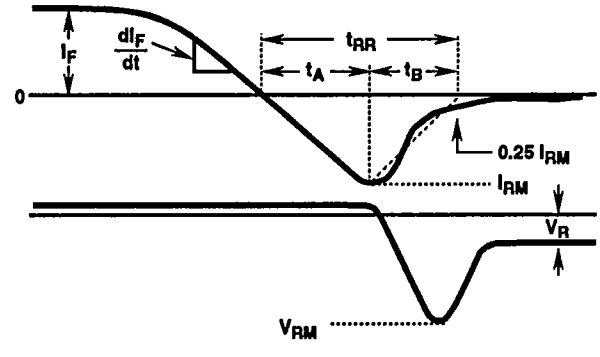


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

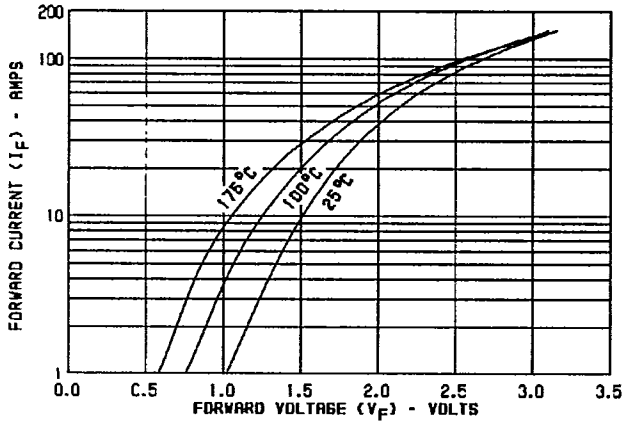


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

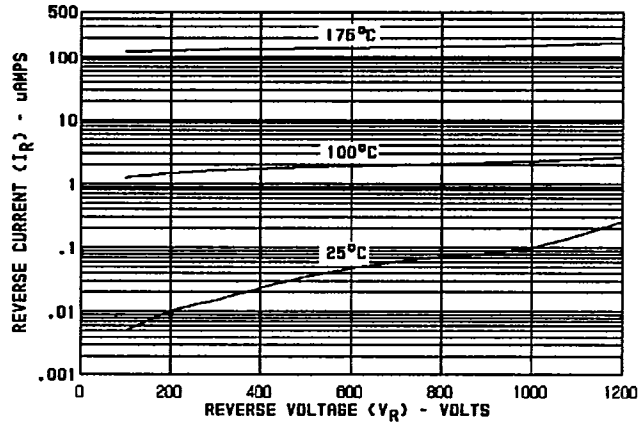


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

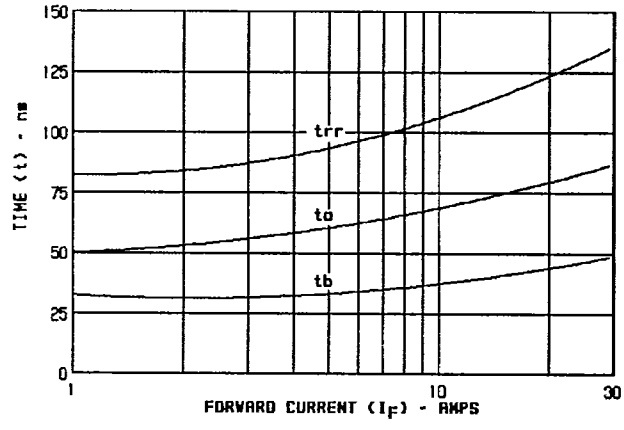


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT

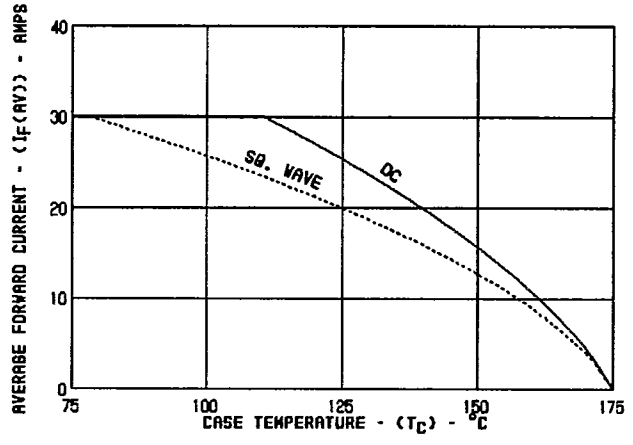


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

I_{MAX} = 1A
L = 40mH
R < 0.1Ω
$W_{AVL} = 1/2LI^2 [V_{AVL}/(V_{AVL} - V_{DD})]$
Q_1 & Q_2 ARE 1000V MOSFETs

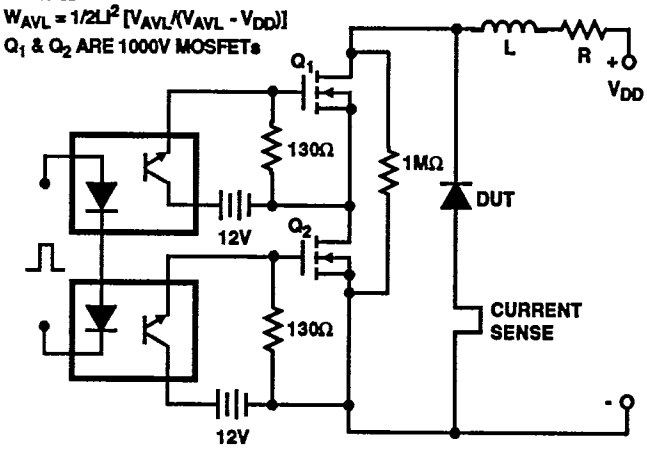


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

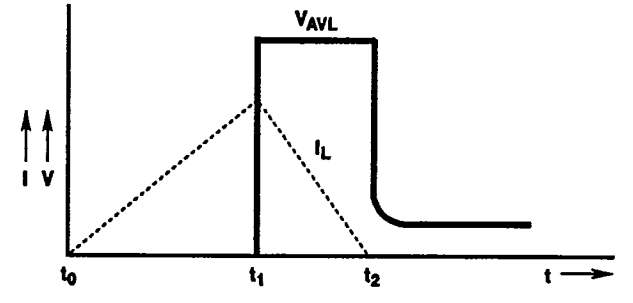
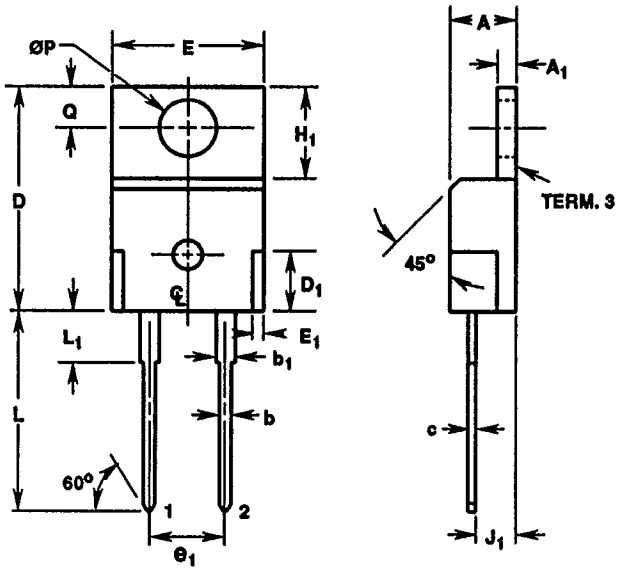


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Packaging

TO-220AB STYLE PLASTIC PACKAGE



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_1.
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.

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_1	0.048	0.052	1.22	1.32	-
b	0.030	0.034	0.77	0.86	3, 4
b_1	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_1	-	0.160	-	4.06	-
E	0.395	0.410	10.04	10.41	-
E_1	-	0.030	-	0.76	-
e_1	0.200 BSC		5.08 BSC		5
H_1	0.235	0.255	5.97	6.47	-
J_1	0.100	0.110	2.54	2.79	6
L	0.530	0.550	13.47	13.97	-
L_1	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	-

Sales Office Headquarters

For general information regarding Harris Semiconductor and its products, call **1-800-4-HARRIS**

UNITED STATES
Harris Semiconductor
1301 Woody Burke Road
Melbourne, Florida 32902
TEL: (407) 724-3000

EUROPE
Harris Semiconductor
Mercure Centre
Rue de la Fusee, 100
1130 Brussels, Belgium
TEL: (32) 2-246-21.11

SOUTH ASIA
Harris Semiconductor H.K. Ltd.
13/F Fourseas Building
208-212 Nathan Road
Tsimshatsui, Kowloon
Hong Kong
TEL: (852) 723-6339

NORTH ASIA
Harris K.K.
Shinjuku NS Bldg. Box 6153
2-4-1 Nishi-Shinjuku
Shinjuku-Ku, Tokyo 163 Japan
TEL: (81) 3-3345-8911

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