HARRIS
SEMICONDUCTOR

RURU150120

April 1996

150A, 1200V Ultrafast Diode

Features

- **Ultrafast with Soft Recovery . . . . <200ns**
- **Operating Temperature . . . . +175°C**
- **Reverse Voltage 1200V**
- **Avalanche Energy Rated**
- **Planar Construction**

Applications

- **Switching Power Supplies**
- **Power Switching Circuits**
- **General Purpose**

Description

The RURU150120 are ultrafast diodes with soft recovery characteristics (t_{RR} < 200ns). 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.

PACKAGE AVAILABILITY

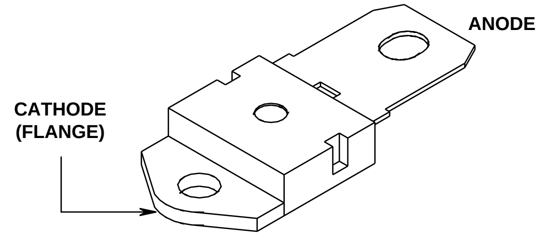
PART NUMBER	PACKAGE	BRAND
RURU150120	TO-218	RUR150120

NOTE: When ordering, use the entire part number.

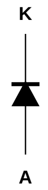
Formerly developmental type TA49073.

Packaging

SINGLE LEAD JEDEC STYLE TO-218



Symbol



Absolute Maximum Ratings $T_A = +25^oC$

		RURU150120	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 . . . . $T_C = 60^oC$	$I_{F(AV)}$	150	A
Repetitive Peak Surge Current . . . . Square Wave, 20kHz	I_{FSM}	300	A
Nonrepetitive Peak Surge Current . . . . Halfwave, 1 Phase, 60Hz	I_{FSM}	1500	A
Maximum Power Dissipation	P_D	375	W
Avalanche Energy (See Figures 10 and 11)	E_{AVL}	50	mj
Operating and Storage Temperature	T_{STG}, T_J	-65 to +175	°C

Electrical Specifications

$T_C = +25^oC$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
V_F	$I_F = 150A$, $T_C = +25^oC$	-	-	2.1	V
	$I_F = 150A$, $T_C = +150^oC$	-	-	1.9	V
I_R	$V_R = 1200V$, $T_C = +25^oC$	-	-	500	µA
	$V_R = 1200V$, $T_C = +150^oC$	-	-	3.0	mA
t_{RR}	$I_F = 1A$, $dI_F/dt = 200A/\mu s$	-	-	200	ns
	$I_F = 150A$, $dI_F/dt = 200A/\mu s$	-	-	250	ns
t_A	$I_F = 150A$, $dI_F/dt = 200A/\mu s$	-	140	-	ns
t_B	$I_F = 150A$, $dI_F/dt = 200A/\mu s$	-	80	-	ns
Q_{RR}	$I_F = 150A$, $dI_F/dt = 200A/\mu s$	-	2000	-	nC
C_J	$V_R = 10V$, $I_F = 0A$	-	420	-	pF
$R_{\theta JC}$		-	-	0.4	$^oC/W$

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300µs, 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).
Q_{RR} = Reverse recovery charge.
C_J = Junction Capacitance.
$R_{\theta JC}$ = Thermal resistance junction to case.
E_{AVL} = Controlled Avalanche Energy (See Figures 10 and 11).
pw = pulse width.
D = duty cycle.

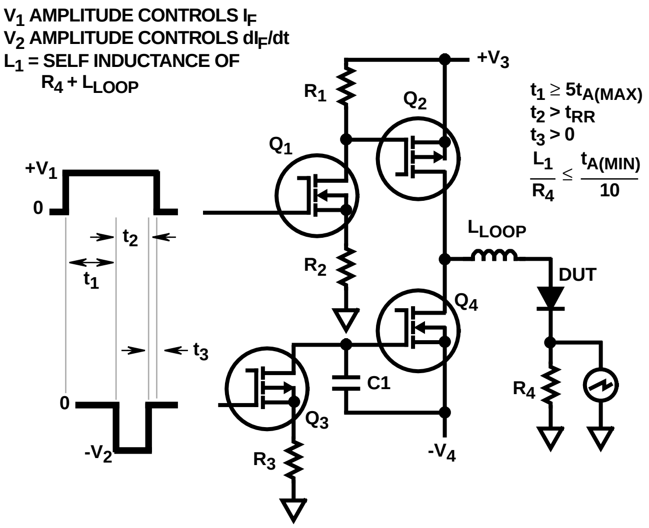


FIGURE 1. t_{RR} TEST CIRCUIT

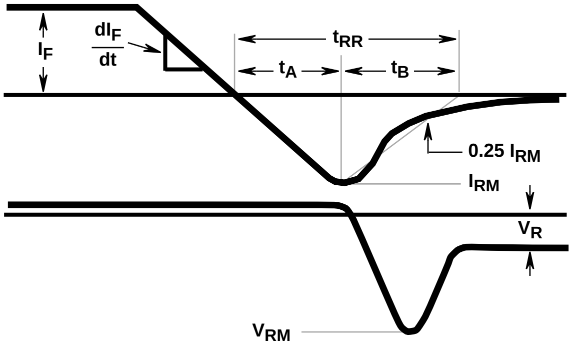


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

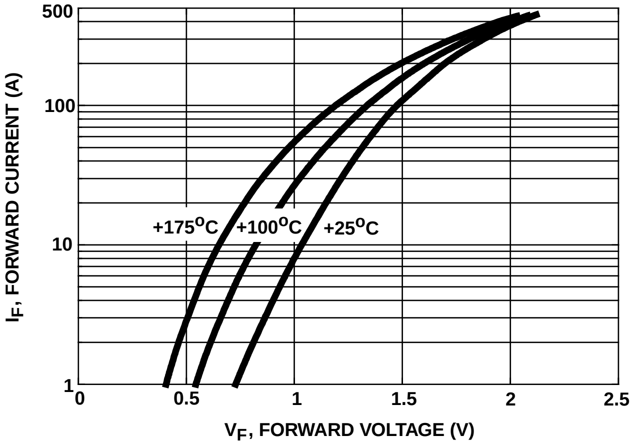


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

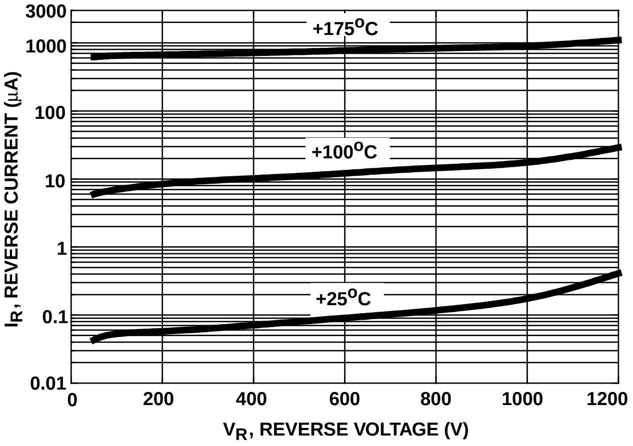


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

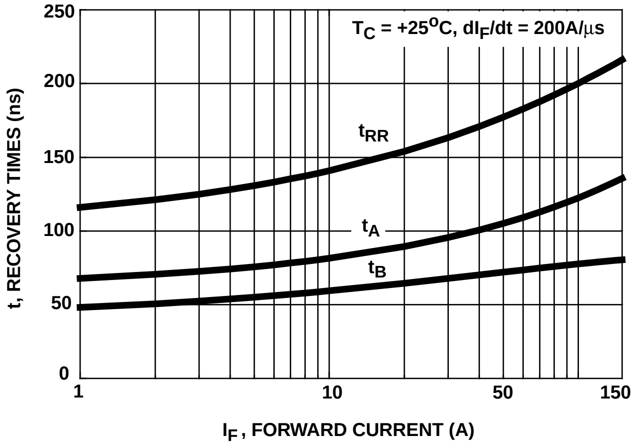


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 25^{O}C

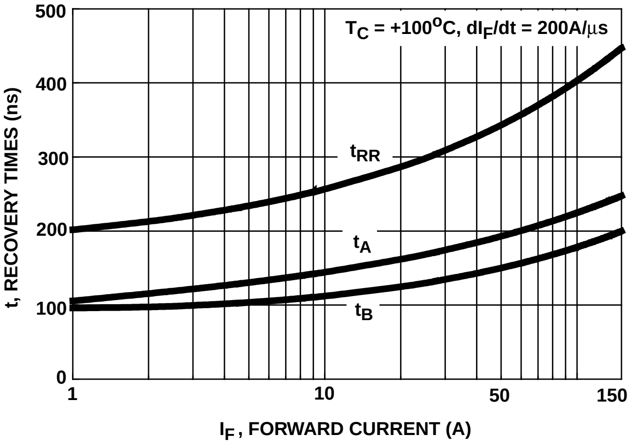


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 100^{O}C

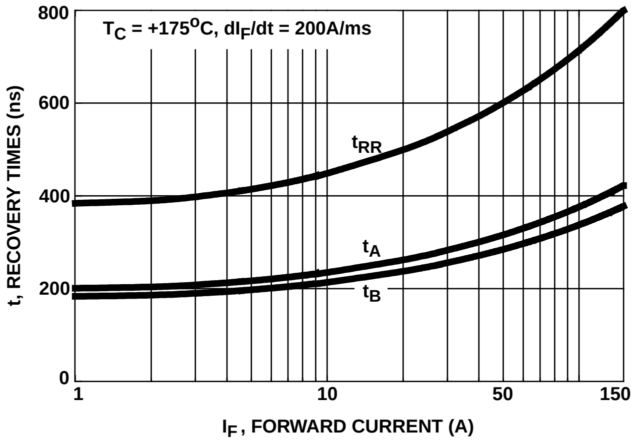


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 175^{O}C

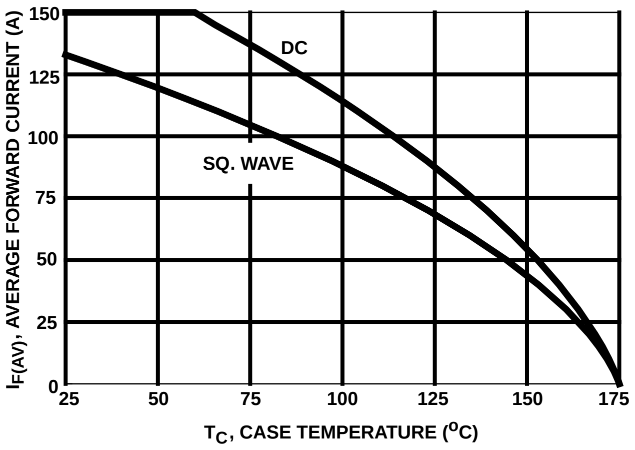


FIGURE 8. CURRENT DERATING CURVE

Typical Performance Curves (Continued)

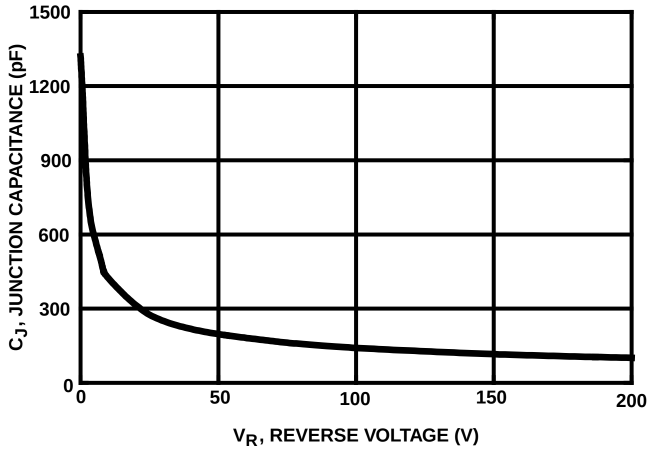


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

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

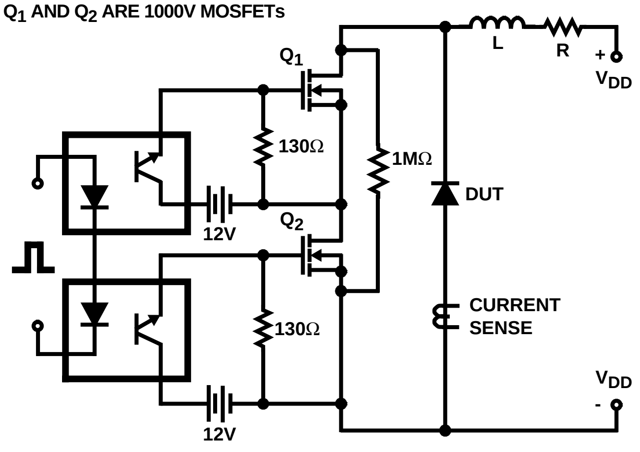


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

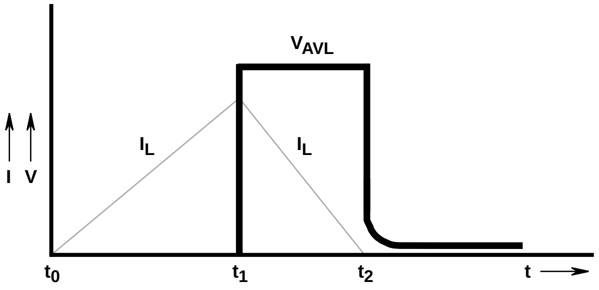
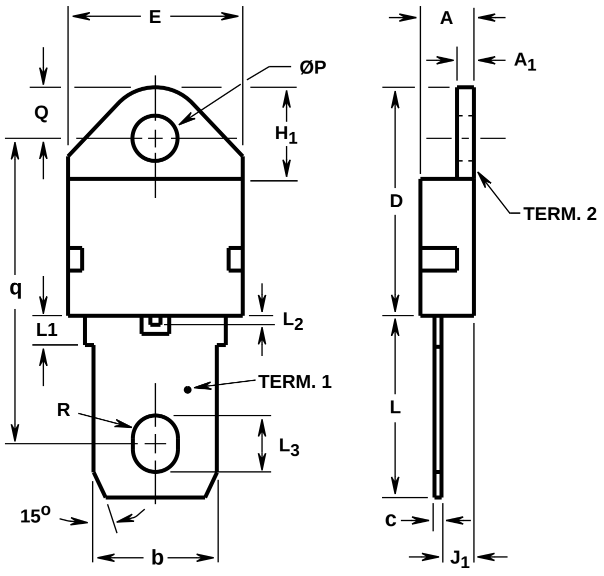


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

TO-218

SINGLE LEAD JEDEC STYLE TO-218 PLASTIC PACKAGE



TERM 1 - ANODE

TERM 2 - CATHODE

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.185	0.195	4.70	4.95	-
A_1	0.058	0.062	1.48	1.57	-
b	0.433	0.443	11.00	11.25	-
c	0.018	0.022	0.46	0.55	-
D	0.800	0.820	20.32	20.82	-
E	0.615	0.625	15.63	15.87	2
H_1	-	0.330	-	8.38	-
J_1	0.115	0.125	2.93	3.17	4
L	0.635	0.655	16.13	16.63	-
L_1	-	0.130	-	3.30	-
L_2	-	0.034	-	0.86	-
L_3	0.195	0.205	4.96	5.20	-
ØP	0.159	0.163	4.04	4.14	-
Q	0.176	0.186	4.48	4.72	2
q	1.080	1.088	27.44	27.63	-
R	0.078	0.082	1.99	2.08	-

NOTES:

1. No current JEDEC outline for this package.
2. Tab outline optional within boundaries of dimensions E and Q.
3. Maximum radius of 0.050 inches (1.27mm) on all body edges and corners.
4. Position of lead to be measured 0.100 inches (2.54mm) from bottom of dimension D.
5. Controlling dimension: Inch.
6. Revision 1 dated 1-93.

All Harris Semiconductor products are manufactured, assembled and tested under **ISO9000** quality systems certification.

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