HARRIS SEMICONDUCTOR

RURU50120

April 1995

50A, 1200V Ultrafast Diode

Features

- **Ultrafast with Soft Recovery . . . . < 125ns**
- **Operating Temperature . . . . +175^{o}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.

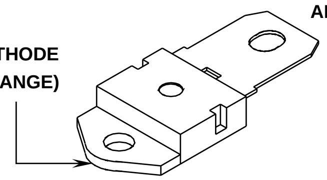
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURU50120	TO-218	RURU50120

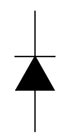
NOTE: When ordering, use the entire part number.

Package

SINGLE LEAD JEDEC STYLE TO-218



Symbol



Absolute Maximum Ratings T_C = +25^{o}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 (T_C = +85^{o}C)	$I_{F(AV)}$	50	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	100	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz)	I_{FSM}	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	^{o}C

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

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

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).
$R_{\theta JC}$ = Thermal resistance junction to case.
E_{AVL} = Controlled avalanche energy (See Figures 10 and 11).
pw = pulse width.
D = duty cycle.

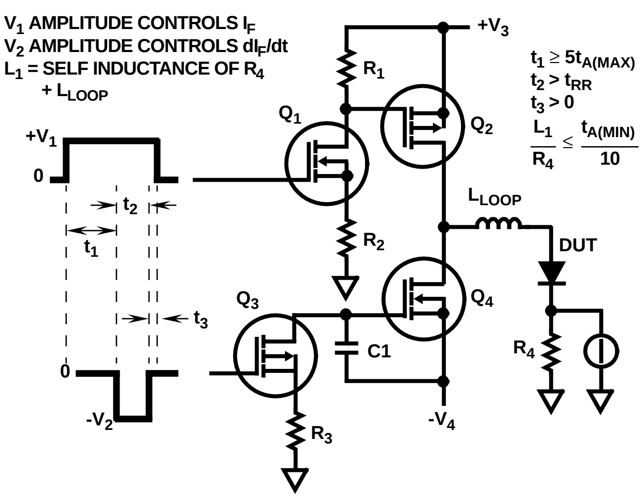


FIGURE 1. t_{RR} TEST CIRCUIT

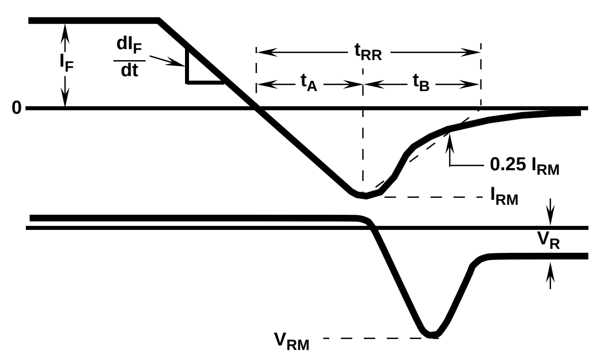


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

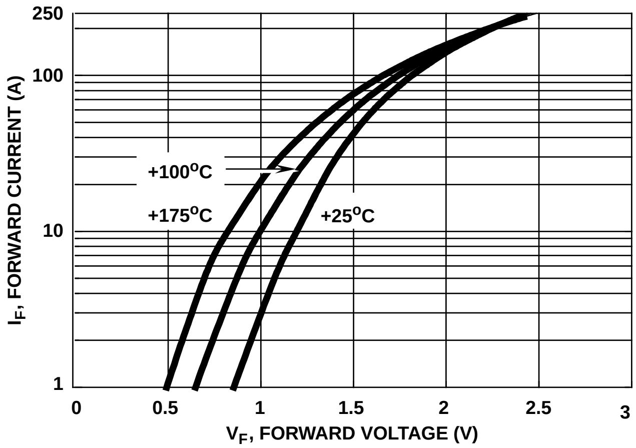


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

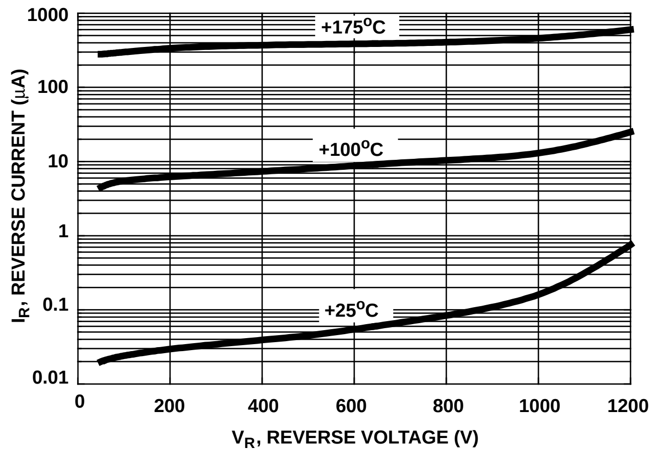


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

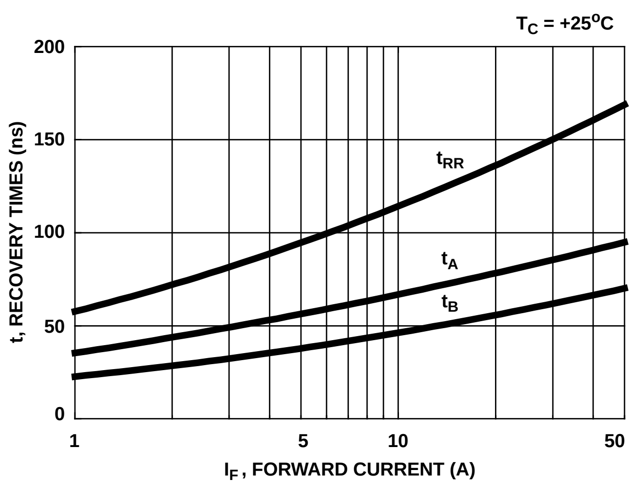


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +25°C

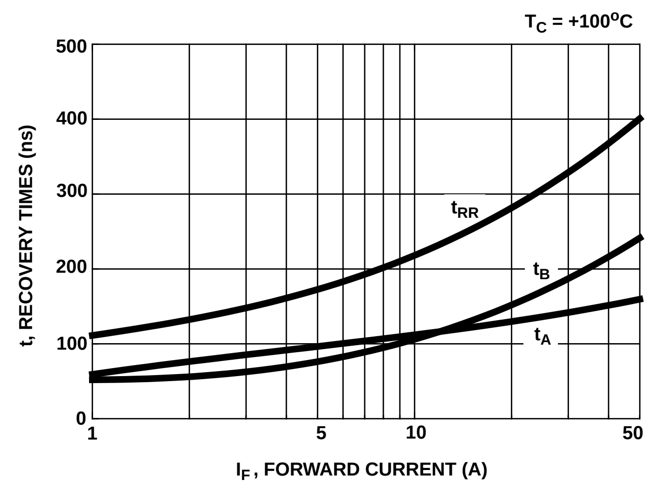


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +100°C

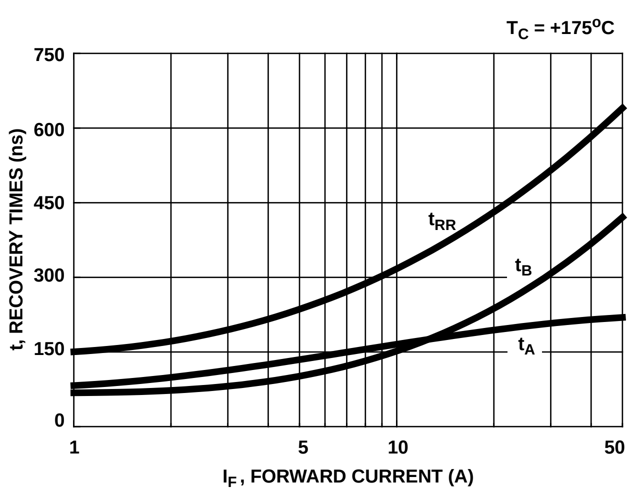


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +175°C

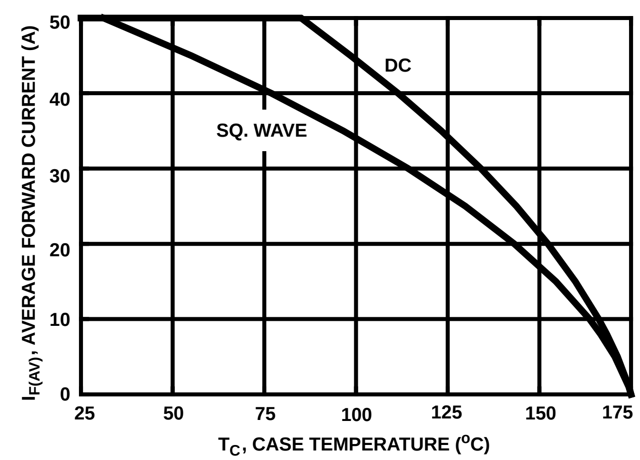


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

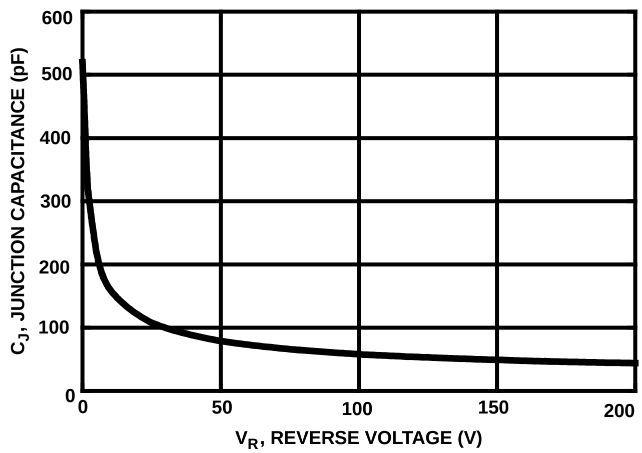


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

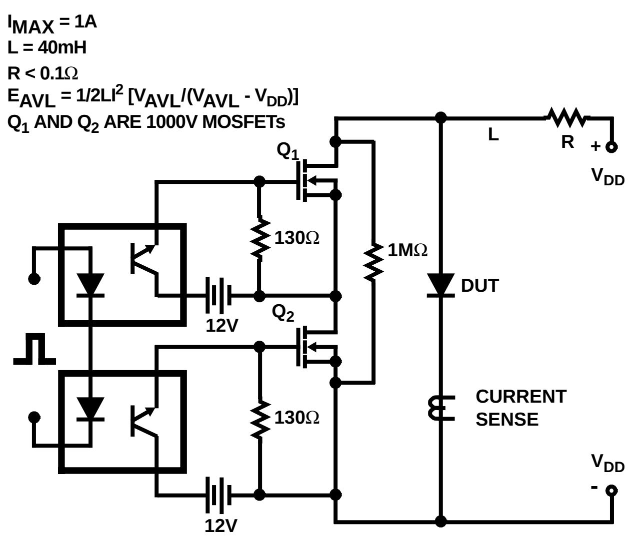


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

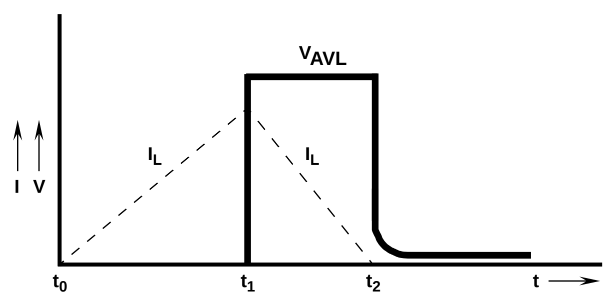


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS