HARRIS SEMICONDUCTOR

RHRU100120

April 1995

100A, 1200V Hyperfast Diode

Features

- **Hyperfast with Soft Recovery . . . . . <90ns**
- **Operating Temperature . . . . . +175^{o}C**
- **Reverse Voltage 1200V**
- **Avalanche Energy Rated**
- **Planar Construction**

Applications

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

Description

The RHRU100120 (TA49070) is a hyperfast diode with soft recovery characteristics (t_{RR} < 90ns). It has half the recovery time of ultrafast diodes 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 hyperfast soft recovery minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

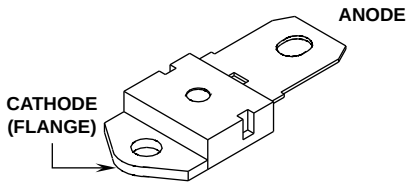
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RHRU100120	TO-218	RHR100120

NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE TO-218



Symbol

Absolute Maximum Ratings

T_C = +25^{o}C, Unless Otherwise Specified

		RHRU100120	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 = +62.5^{o}C)	$I_{F(AV)}$	100	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	200	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz)	I_{FSM}	1000	A
Maximum Power Dissipation	P_D	300	W
Avalanche Energy (L = 40mH)	E_{AVL}	50	mj
Operating and Storage Temperature	T_{STG}, T_J	-65 to +175	^{o}C

File Number **3145.2**

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

SYMBOL	TEST CONDITION		LIMITS MIN	LIMITS TYP	LIMITS MAX	UNITS
V_F	I_F = 100A	$T_C = +25^oC$	-	-	3.2	V
V_F	I_F = 100A	$T_C = +150^oC$	-	-	2.6	V
I_R	V_R = 1200V	$T_C = +25^oC$	-	-	500	µA
I_R	V_R = 1200V	$T_C = +150^oC$	-	-	2	mA
t_{RR}	I_F = 1A, dI_F/dt = 100A/µs		-	-	90	ns
	I_F = 100A, dI_F/dt = 100A/µs		-	-	100	ns
t_A	I_F = 100A, dI_F/dt = 100A/µs		-	60	-	ns
t_B	I_F = 100A, dI_F/dt = 100A/µs		-	25	-	ns
$R_{\theta JC}$			-	-	0.5	$^oC/W$

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 7 and 8).

pw = pulse width.

D = duty cycle.

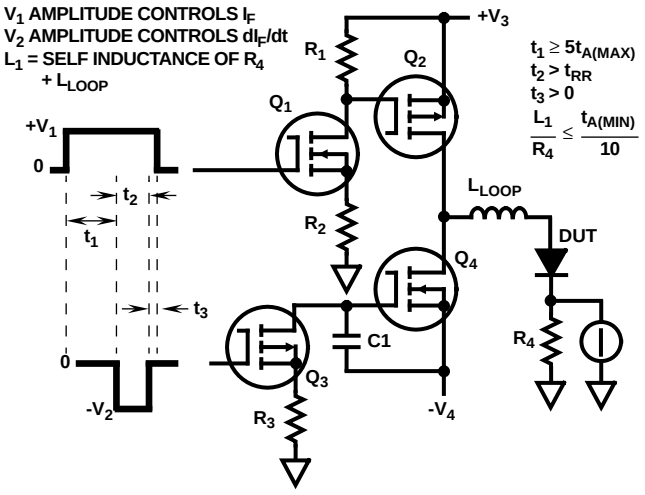


FIGURE 1. t_{RR} TEST CIRCUIT

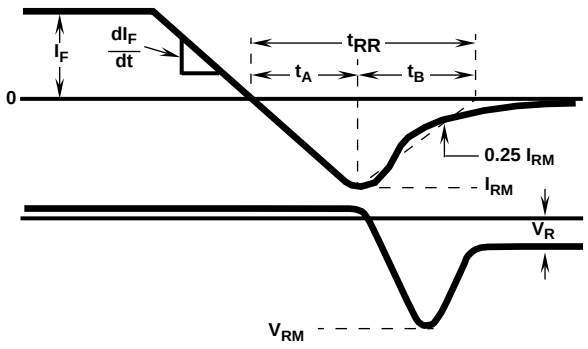


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

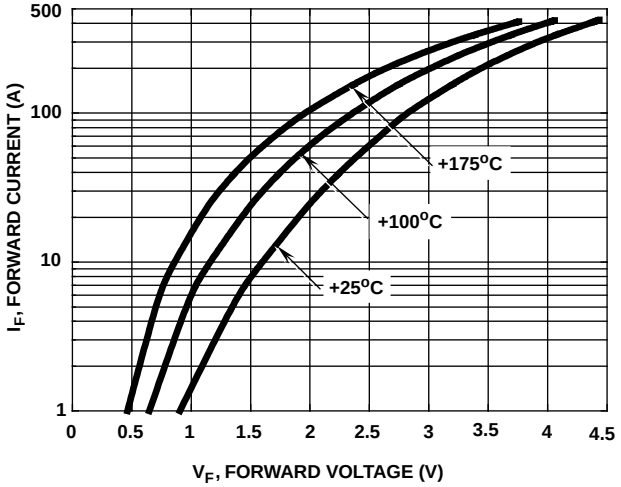


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

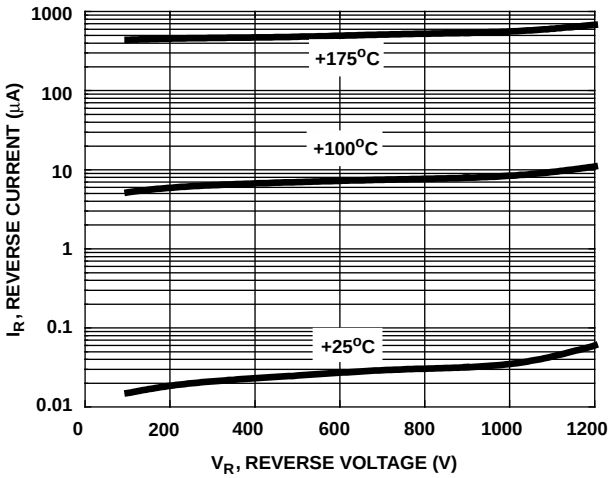


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

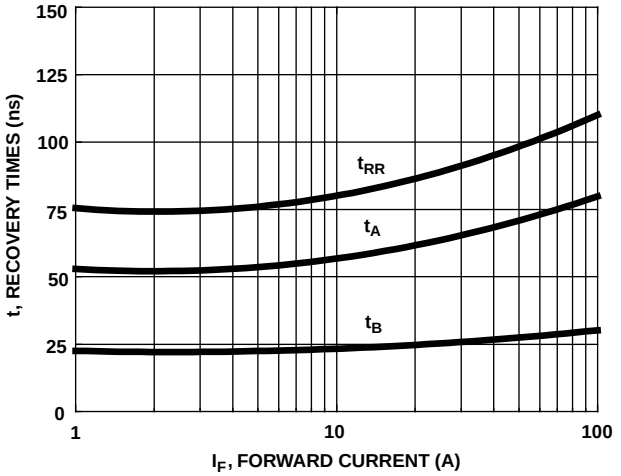


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT

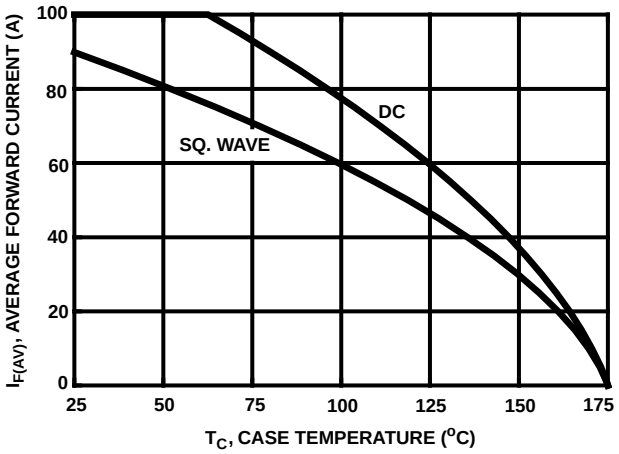


FIGURE 6. CURRENT DERATING CURVE

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

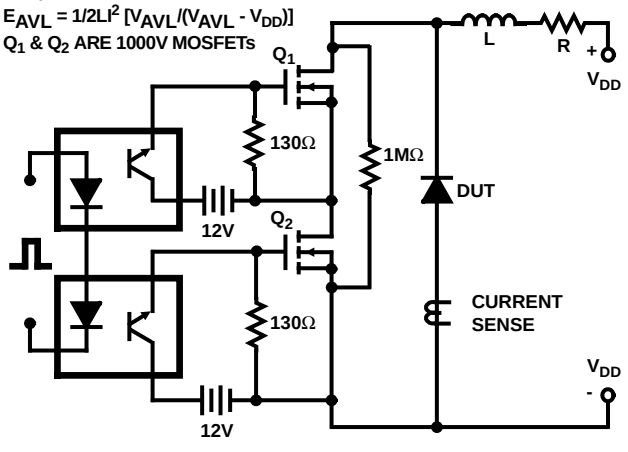


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

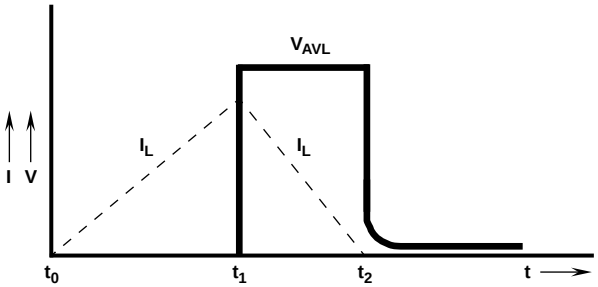


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS