HARRIS SEMICONDUCTOR

RHRU5070, RHRU5080, RHRU5090 RHRU50100

April 1995

50A, 700V - 1000V Hyperfast Diodes

Features

- Hyperfast with Soft Recovery .... <75ns
- Operating Temperature .... +175°C
- Reverse Voltage Up To 1000V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Description

RHRU5070, RHRU5080, RHRU5090 and RHRU50100 (TA49066) are hyperfast diodes with soft recovery characteristics (t_{RR} < 75ns). They have half the recovery time of ultrafast diodes 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 hyperfast soft recovery minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

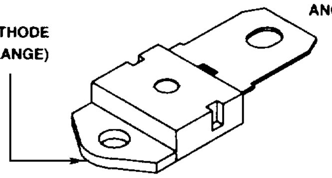
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RHRU5070	TO-218	RHRU5070
RHRU5080	TO-218	RHRU5080
RHRU5090	TO-218	RHRU5090
RHRU50100	TO-218	RHRU50100

NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE TO-218



Symbol

7

HYPERFAST SINGLE DIODES

Absolute Maximum Ratings T_C = +25°C, Unless Otherwise Specified

		RHRU5070	RHRU5080	RHRU5090	RHRU50100	UNITS
Peak Repetitive Reverse Voltage	V_{RRM}	700	800	900	1000	V
Working Peak Reverse Voltage	V_{RWM}	700	800	900	1000	V
DC Blocking Voltage	V_R	700	800	900	1000	V
Average Rectified Forward Current (T_C = +65°C)	$I_{F(AV)}$	50	50	50	50	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	100	100	100	100	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz)	I_{FSM}	500	500	500	500	A
Maximum Power Dissipation	P_D	150	150	150	150	W
Avalanche Energy (L = 40mH)	E_{AVL}	40	40	40	40	mj
Operating and Storage Temperature	T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	-65 to +175	°C

File Number **3665.1**

Electrical Specifications T_C = +25°C, Unless Otherwise Specified

SYMBOL	TEST CONDITION	RHRU5070			RHRU5080			RHRU5090			RHRU50100			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	I_F = 50A, T_C = +25°C	-	-	3.0	-	-	3.0	-	-	3.0	-	-	3.0	V
	I_F = 50A, T_C = +150°C	-	-	2.5	-	-	2.5	-	-	2.5	-	-	2.5	V
I_R	V_R = 700V, T_C = +25°C	-	-	500	-	-	-	-	-	-	-	-	-	µA
	V_R = 800V, T_C = +25°C	-	-	-	-	-	500	-	-	-	-	-	-	µA
	V_R = 900V, T_C = +25°C	-	-	-	-	-	-	-	-	500	-	-	-	µA
	V_R = 1000V, T_C = +25°C	-	-	-	-	-	-	-	-	-	-	-	500	µA
I_R	V_R = 700V, T_C = +150°C	-	-	3.0	-	-	-	-	-	-	-	-	-	mA
	V_R = 800V, T_C = +150°C	-	-	-	-	-	3.0	-	-	-	-	-	-	mA
	V_R = 900V, T_C = +150°C	-	-	-	-	-	-	-	-	3.0	-	-	-	mA
	V_R = 1000V, T_C = +150°C	-	-	-	-	-	-	-	-	-	-	-	3.0	mA
t_{RR}	I_F = 1A, dI_F/dt = 100A/µs	-	-	75	-	-	75	-	-	75	-	-	75	ns
	I_F = 50A, dI_F/dt = 100A/µs	-	-	95	-	-	95	-	-	95	-	-	95	ns
t_A	I_F = 50A, dI_F/dt = 100A/µs	-	54	-	-	54	-	-	54	-	-	54	-	ns
t_B	I_F = 50A, dI_F/dt = 100A/µs	-	32	-	-	32	-	-	32	-	-	32	-	ns
Q_{RR}	I_F = 50A, dI_F/dt = 100A/µs	-	125	-	-	125	-	-	125	-	-	125	-	nC
C_J	V_R = 10V, I_F = 0A	-	150	-	-	150	-	-	150	-	-	150	-	pF
$R_{θJC}$		-	-	1.0	-	-	1.0	-	-	1.0	-	-	1.0	°C/W

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300µs, D = 2%).
I_R = Instantaneous reverse current.
t_{RR} = Reverse recovery time (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).
$R_{θJC}$ = Thermal resistance junction to case.
E_{AVL} = Controlled avalanche energy (See Figure 10 and Figure 11).
pw = Pulse width.
D = Duty cycle.

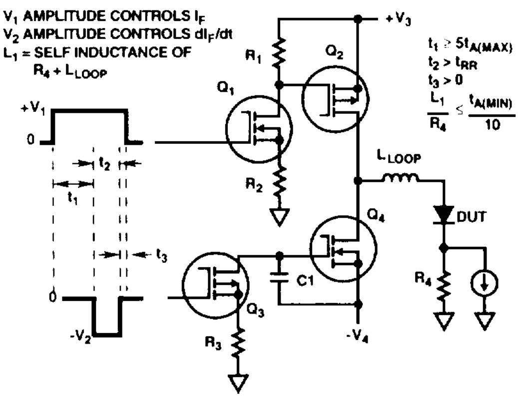


FIGURE 1. t_{RR} TEST CIRCUIT

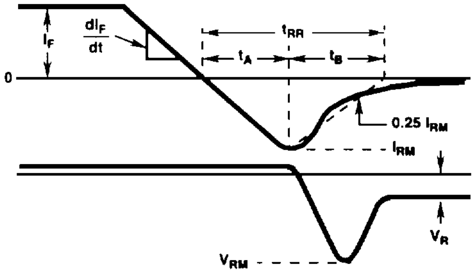


FIGURE 2. WAVEFORMS AND DEFINITIONS

Typical Performance Curves

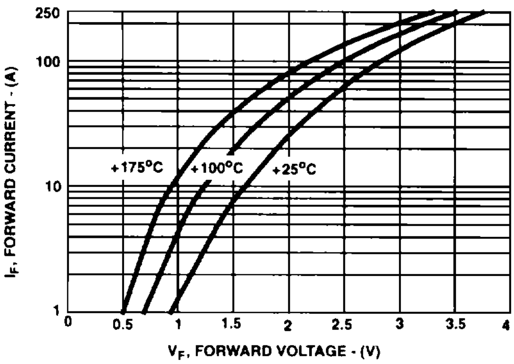


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

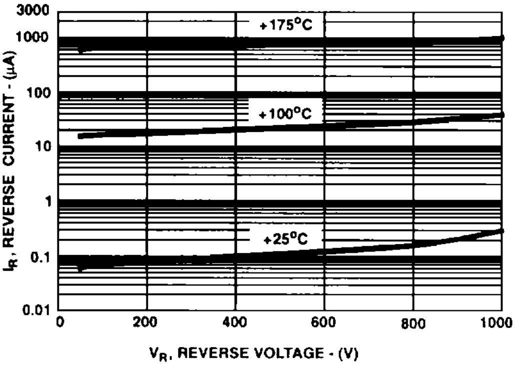


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

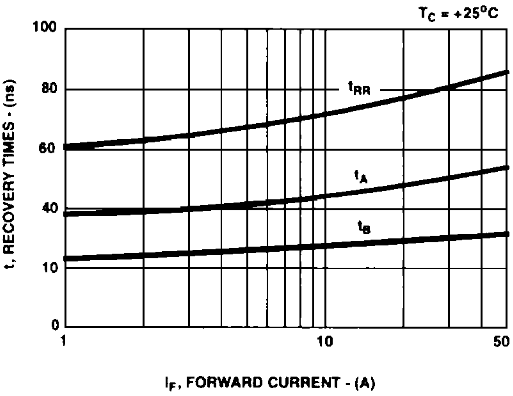


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +25°C

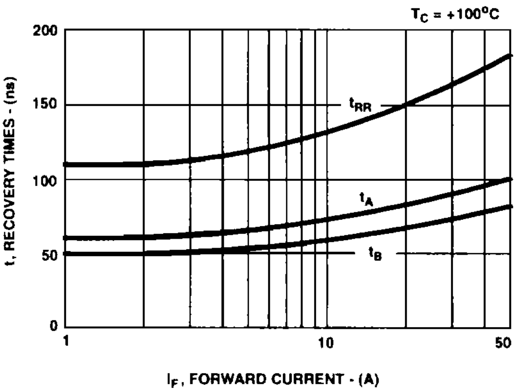


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +100°C

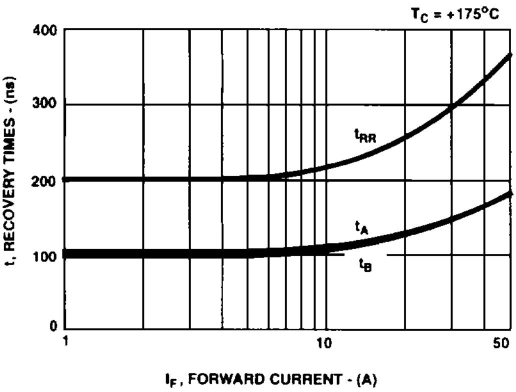


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +175°C

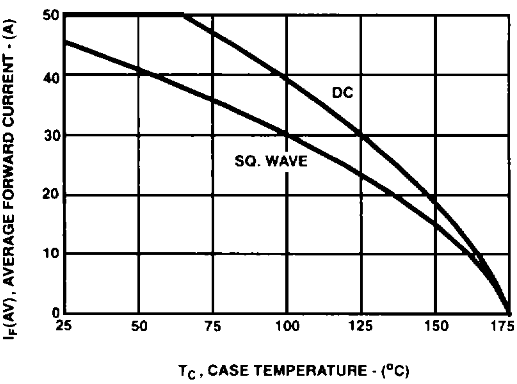


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

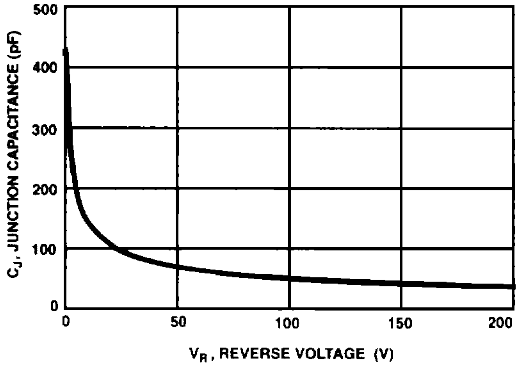


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuit and Waveforms

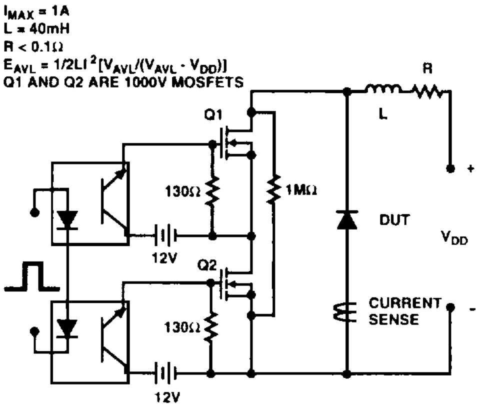


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

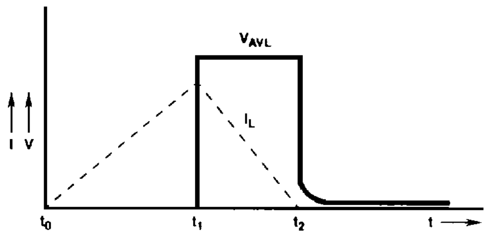


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS