

April 1995

100A, 400V - 600V Hyperfast Diodes

Features

- Hyperfast with Soft Recovery..... < 50ns
- Operating Temperature..... +175°C
- Reverse Voltage Up to..... 600V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Description

RHRU10040, RHRU10050 and RHRU10060 (TA49069) are hyperfast diodes with soft recovery characteristics ($t_{RR} < 50\text{ns}$). 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.

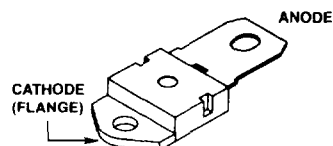
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RHRU10040	TO-218	RHRU10040
RHRU10050	TO-218	RHRU10050
RHRU10060	TO-218	RHRU10060

NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE TO-218



Symbol



Absolute Maximum Ratings $T_C = +25^\circ\text{C}$

	RHRU10040	RHRU10050	RHRU10060	UNITS
Peak Repetitive Reverse Voltage..... V_{RRM}	400	500	600	V
Working Peak Reverse Voltage..... V_{RWM}	400	500	600	V
DC Blocking Voltage..... V_R	400	500	600	V
Average Rectified Forward Current..... $I_{F(AV)}$ ($T_C = +60.8^\circ\text{C}$)	100	100	100	A
Repetitive Peak Surge Current..... I_{FSM} (Square Wave, 20kHz)	200	200	200	A
Nonrepetitive Peak Surge Current..... I_{FSM} (Halfwave, 1 Phase, 60Hz)	1000	1000	1000	A
Maximum Power Dissipation..... P_D	210	210	210	W
Avalanche Energy..... E_{AVL} ($L = 40\text{mH}$)	50	50	50	mJ
Operating and Storage Temperature..... T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	$^\circ\text{C}$

Specifications RHRU10040, RHRU10050, RHRU10060

Electrical Specifications $T_C = +25^{\circ}\text{C}$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	RHRU10040 LIMITS			RHRU10050 LIMITS			RHRU10060 LIMITS			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 100\text{A}$	-	-	2.1	-	-	2.1	-	-	2.1	V
V_F	$I_F = 100\text{A}$ $T_C = +150^{\circ}\text{C}$	-	-	1.7	-	-	1.7	-	-	1.7	V
I_R	$V_R = 400\text{V}$	-	-	500	-	-	-	-	-	-	μA
	$V_R = 500\text{V}$	-	-	-	-	-	500	-	-	-	μA
	$V_R = 600\text{V}$	-	-	-	-	-	-	-	-	500	μA
I_R	$V_R = 400\text{V}$ $T_C = +150^{\circ}\text{C}$	-	-	2.0	-	-	-	-	-	-	mA
	$V_R = 500\text{V}$ $T_C = +150^{\circ}\text{C}$	-	-	-	-	-	2.0	-	-	-	mA
	$V_R = 600\text{V}$ $T_C = +150^{\circ}\text{C}$	-	-	-	-	-	-	-	-	2.0	mA
t_{RR}	$I_F = 1\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	50	-	-	50	-	-	50	ns
t_{RR}	$I_F = 100\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	60	-	-	60	-	-	60	ns
t_A	$I_F = 100\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{s}$	-	28	-	-	28	-	-	28	-	ns
t_B	$I_F = 100\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{s}$	-	18	-	-	18	-	-	18	-	ns
$R_{\theta JC}$		-	-	0.71	-	-	0.71	-	-	0.71	$^{\circ}\text{C}/\text{W}$

DEFINITIONS

V_F = Instantaneous forward voltage ($p_w = 300\mu\text{s}$, $D = 2\%$).

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).

p_w = pulse width.

D = duty cycle.

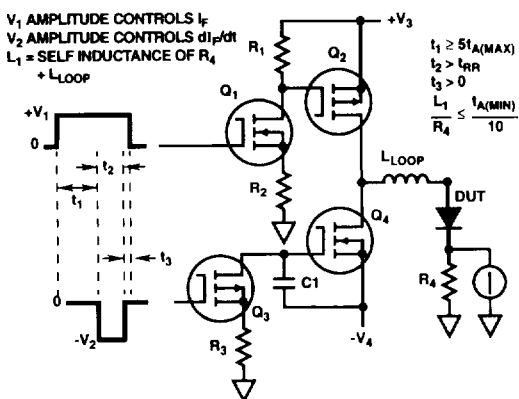


FIGURE 1. t_{RR} TEST CIRCUIT

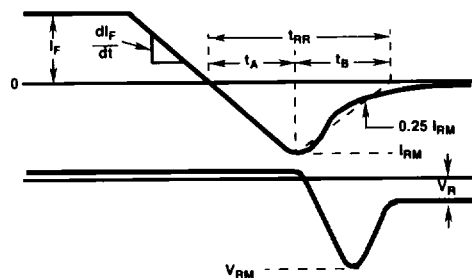


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

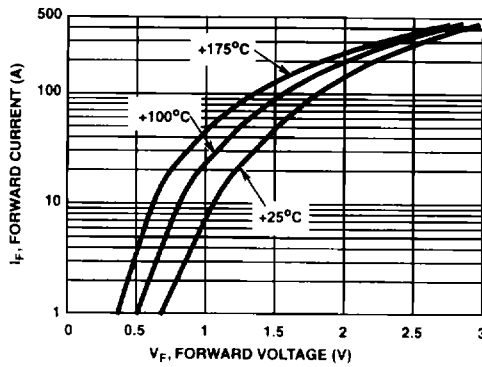


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

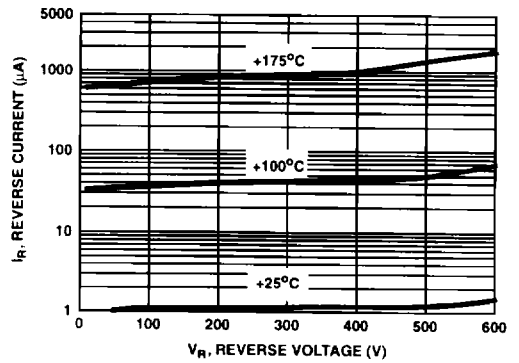


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

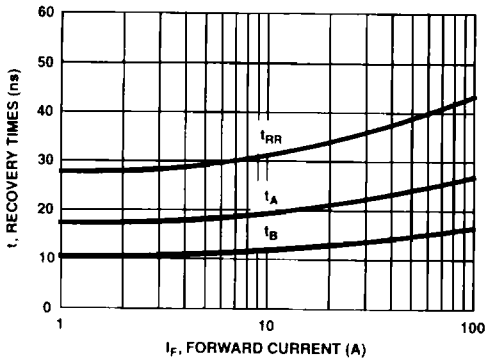


FIGURE 5. TYPICAL t_{RR} , t_A AND t_B CURVES vs FORWARD CURRENT

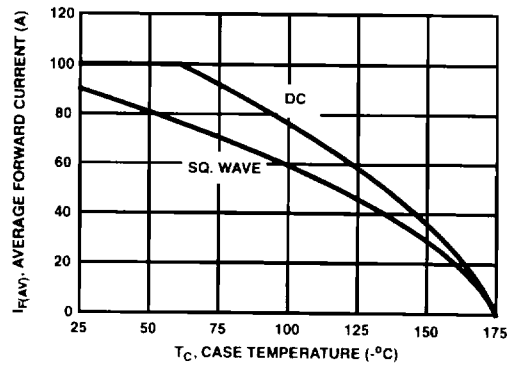


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

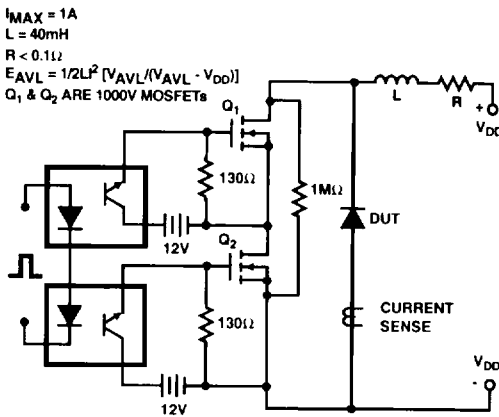


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

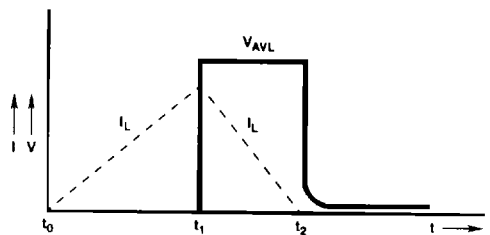


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS