

## 75A, 400V - 600V Hyperfast Diodes

RHRU7540, RHRU7550 and RHRU7560 (TA49067) are hyperfast diodes with soft recovery characteristics ( $t_{RR} < 55\text{ns}$ ). 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.

## Ordering Information

### PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RHRU7540	TO-218	RHRU7540
RHRU7550	TO-218	RHRU7550
RHRU7560	TO-218	RHRU7560

NOTE: When ordering, use the entire part number.

## Features

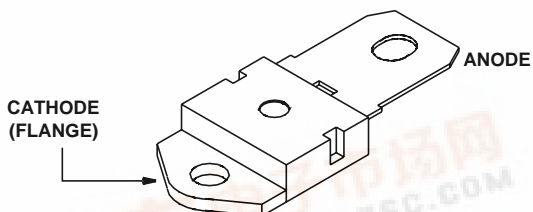
- Hyperfast with Soft Recovery .....<55ns
- Operating Temperature ..... +175°C
- Reverse Voltage Up To .....600V
- Avalanche Energy Rated
- Planar Construction

## Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

## Package

SINGLE LEAD JEDEC STYLE TO-218



## Symbol



## Absolute Maximum Ratings $T_C = +25^\circ\text{C}$ , Unless Otherwise Specified

	RHRU7540	RHRU7550	RHRU7560	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 ..... $I_{F(AV)}$ ( $T_C = +80^\circ\text{C}$ )	75	75	75	A
Repetitive Peak Surge Current ..... $I_{FSM}$ (Square Wave, 20kHz)	150	150	150	A
Nonrepetitive Peak Surge Current ..... $I_{FSM}$ (Halfwave, 1 Phase, 60Hz)	750	750	750	A
Maximum Power Dissipation ..... $P_D$	190	190	190	W
Avalanche Energy (See Figures 10 and 11) ..... $E_{AVL}$	50	50	50	mj
Operating and Storage Temperature ..... $T_{STG}, T_J$	-65 to +175	-65 to +175	-65 to +175	$^\circ\text{C}$



## RHRU7540, RHRU7550, RHRU7560

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

SYMBOL	TEST CONDITION	RHRU7540			RHRU7550			RHRU7560			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
$V_F$	$I_F = 75\text{A}, T_C = +25^\circ\text{C}$	-	-	2.1	-	-	2.1	-	-	2.1	V
	$I_F = 75\text{A}, T_C = +150^\circ\text{C}$	-	-	1.7	-	-	1.7	-	-	1.7	V
$I_R$	$V_R = 400\text{V}, T_C = +25^\circ\text{C}$	-	-	500	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 500\text{V}, T_C = +25^\circ\text{C}$	-	-	-	-	-	500	-	-	-	$\mu\text{A}$
	$V_R = 600\text{V}, T_C = +25^\circ\text{C}$	-	-	-	-	-	-	-	-	500	$\mu\text{A}$
$I_R$	$V_R = 400\text{V}, T_C = +150^\circ\text{C}$	-	-	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
$t_{RR}$	$I_F = 1\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	55	-	-	55	-	-	55	ns
	$I_F = 75\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	60	-	-	60	-	-	60	ns
$t_A$	$I_F = 75\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	35	-	-	35	-	-	35	-	ns
$t_B$	$I_F = 75\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	18	-	-	18	-	-	18	-	ns
$Q_{RR}$	$I_F = 75\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	90	-	-	90	-	-	90	-	nC
$C_J$	$V_R = 10\text{V}, I_F = 0\text{A}$	-	200	-	-	200	-	-	200	-	pF
$R_{\theta JC}$		-	-	0.8	-	-	0.8	-	-	0.8	$^\circ\text{C}/\text{W}$

#### DEFINITIONS

- $V_F$  = Instantaneous forward voltage (pw = 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).
- $Q_{RR}$  = 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.

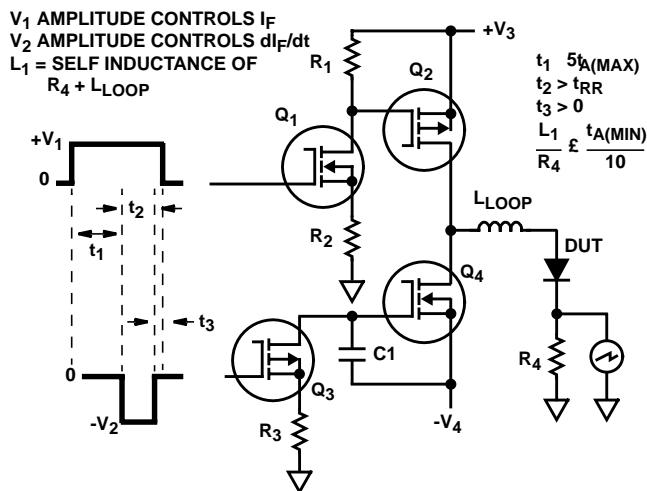


FIGURE 1.  $t_{RR}$  TEST CIRCUIT

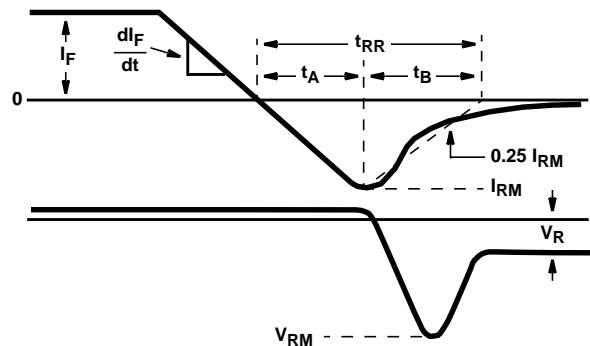


FIGURE 2.  $t_{RR}$  WAVEFORMS AND DEFINITIONS

# RHRU7540, RHRU7550, RHRU7560

## Typical Performance Curves

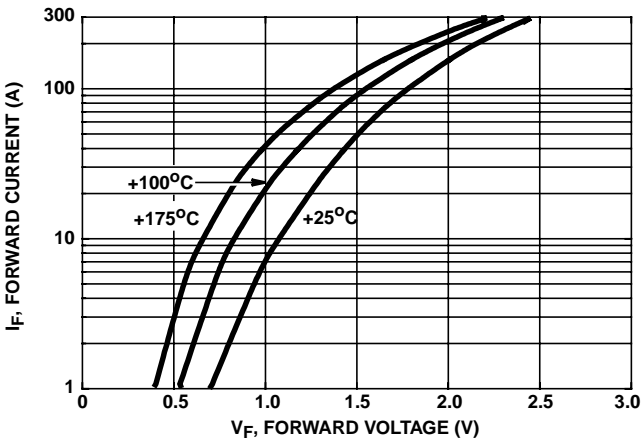


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

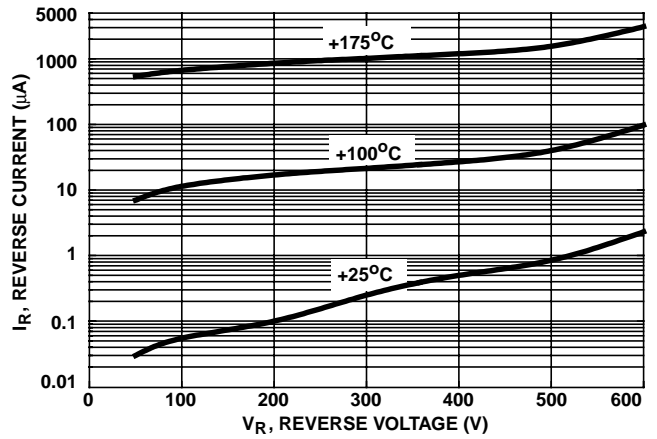


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

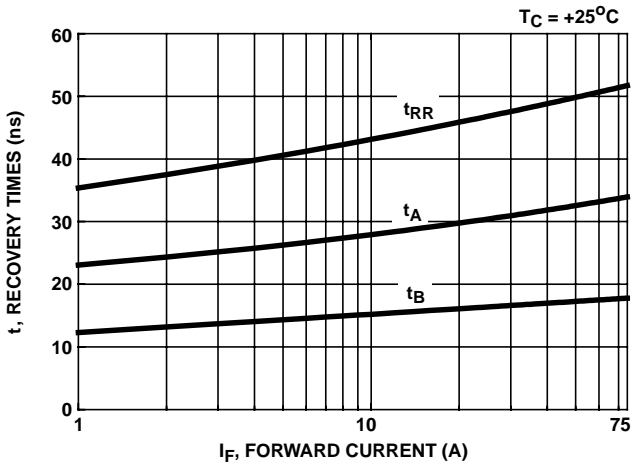


FIGURE 5. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT AT +25°C

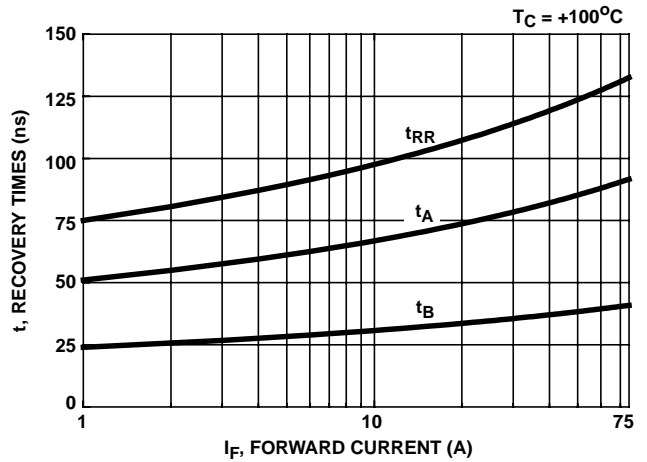


FIGURE 6. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT AT +100°C

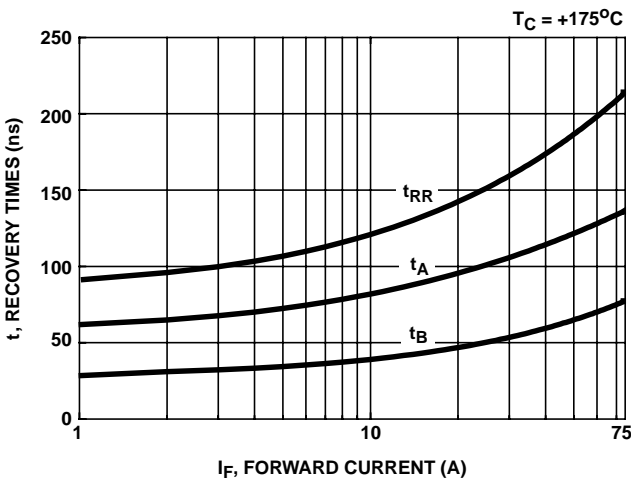


FIGURE 7. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT AT +175°C

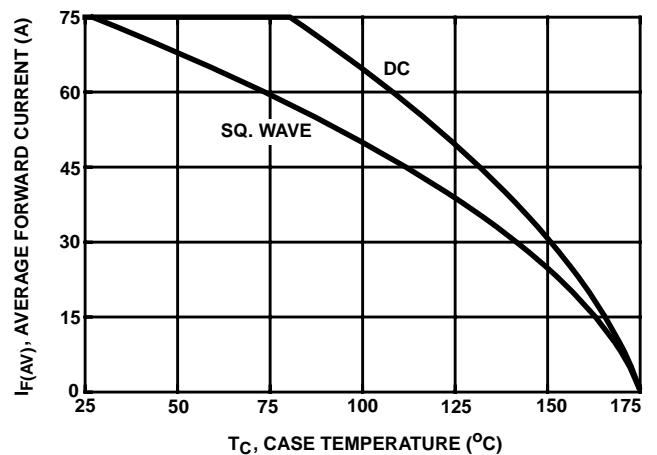


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

## RHRU7540, RHRU7550, RHRU7560

### Typical Performance Curves (Continued)

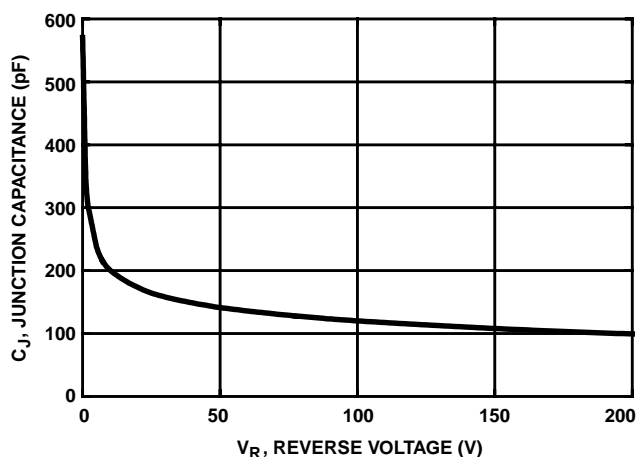


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

### Test Circuit and Waveforms

$I_{MAX} = 1A$

$L = 40mH$

$R < 0.1\Omega$

$E_{AVL} = 1/2LI^2 [V_{AVL}/(V_{AVL} - V_{DD})]$

$Q_1$  AND  $Q_2$  ARE 1000V MOSFETs

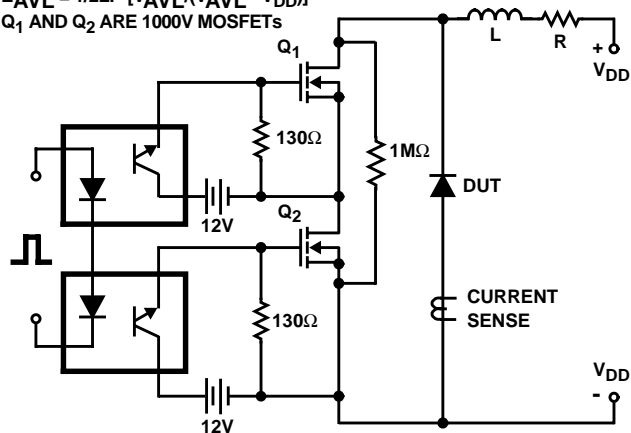


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

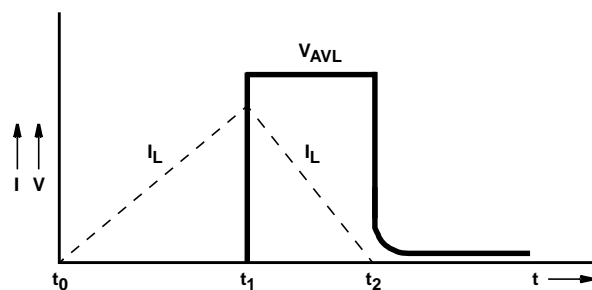


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORM

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