HARRIS SEMICONDUCTOR

RHRG7540, RHRG7550, RHRG7560

April 1995

75A, 400V - 600V Hyperfast Diodes

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

Description

RHRG7540, RHRG7550 and RHRG7560 are hyperfast diodes with soft recovery characteristics (t_{RR} < 55ns). 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

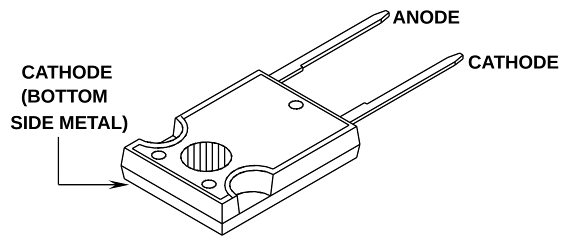
PART NUMBER	PACKAGE	BRAND
RHRG7540	TO-247	RHRG7540
RHRG7550	TO-247	RHRG7550
RHRG7560	TO-247	RHRG7560

NOTE: When ordering, use the entire part number.

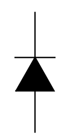
Formerly developmental type TA49067.

Package

JEDEC STYLE TO-247



Symbol



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

		RHRG7540	RHRG7550	RHRG7560	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 (T_C = +80°C)	$I_{F(AV)}$	75	75	75	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	150	150	150	A
Nonrepetitive Peak Surge Current (Halfwave, 1 phase, 60Hz)	I_{FSM}	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	°C

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

SYMBOL	TEST CONDITION	RHRG7540 MIN	RHRG7540 TYP	RHRG7540 MAX	RHRG7550 MIN	RHRG7550 TYP	RHRG7550 MAX	RHRG7560 MIN	RHRG7560 TYP	RHRG7560 MAX	UNITS
V_F	$I_F = 75A$, $T_C = +25^oC$	-	-	2.1	-	-	2.1	-	-	2.1	V
	$I_F = 75A$, $T_C = +150^oC$	-	-	1.7	-	-	1.7	-	-	1.7	V
I_R	$V_R = 400V$, $T_C = +25^oC$	-	-	500	-	-	-	-	-	-	μA
	$V_R = 500V$, $T_C = +25^oC$	-	-	-	-	-	500	-	-	-	μA
	$V_R = 600V$, $T_C = +25^oC$	-	-	-	-	-	-	-	-	500	μA
I_R	$V_R = 400V$, $T_C = +150^oC$	-	-	2.0	-	-	-	-	-	-	mA
	$V_R = 500V$, $T_C = +150^oC$	-	-	-	-	-	2.0	-	-	-	mA
	$V_R = 600V$, $T_C = +150^oC$	-	-	-	-	-	-	-	-	2.0	mA
t_{RR}	$I_F = 1A$, $dI_F/dt = 200A/\mu s$	-	-	55	-	-	55	-	-	55	ns
	$I_F = 75A$, $dI_F/dt = 200A/\mu s$	-	-	60	-	-	60	-	-	60	ns
t_A	$I_F = 75A$, $dI_F/dt = 200A/\mu s$	-	27	-	-	27	-	-	27	-	ns
t_B	$I_F = 75A$, $dI_F/dt = 200A/\mu s$	-	23	-	-	23	-	-	23	-	ns
Q_{RR}	$I_F = 75A$, $dI_F/dt = 200A/\mu s$	-	140	-	-	140	-	-	140	-	nC
C_J	$V_R = 10V$, $I_F = 0A$	-	200	-	-	200	-	-	200	-	pF
$R_{\theta JC}$		-	-	0.8	-	-	0.8	-	-	0.8	$^oC/W$

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).
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.

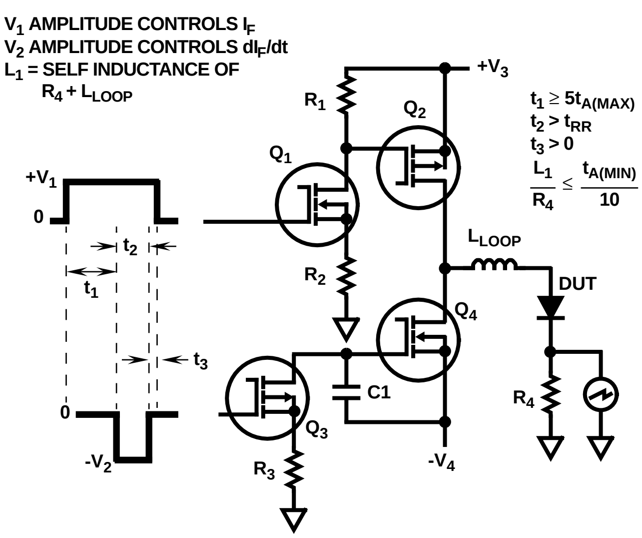


FIGURE 1. t_{RR} **TEST CIRCUIT**

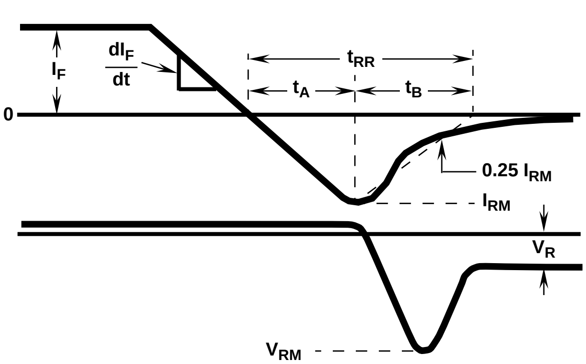


FIGURE 2. t_{RR} **WAVEFORMS AND DEFINITIONS**

Typical Performance Curves

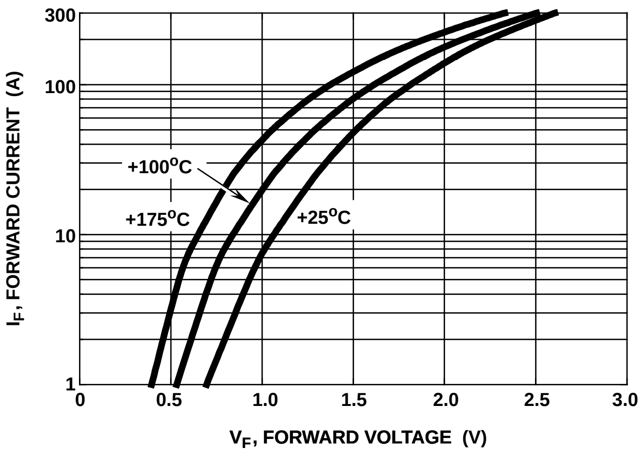


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

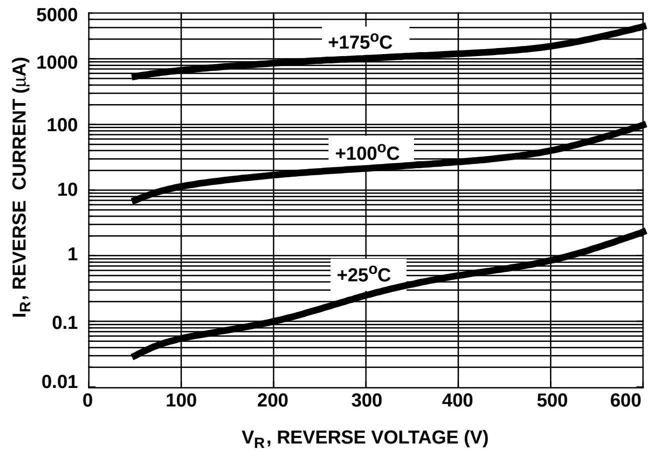


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

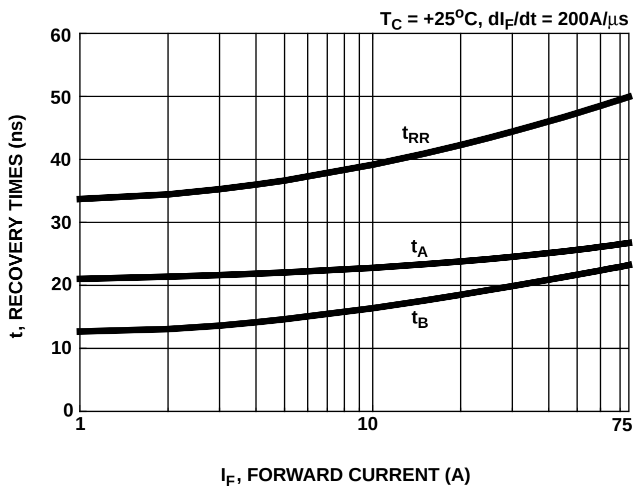


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +25°C

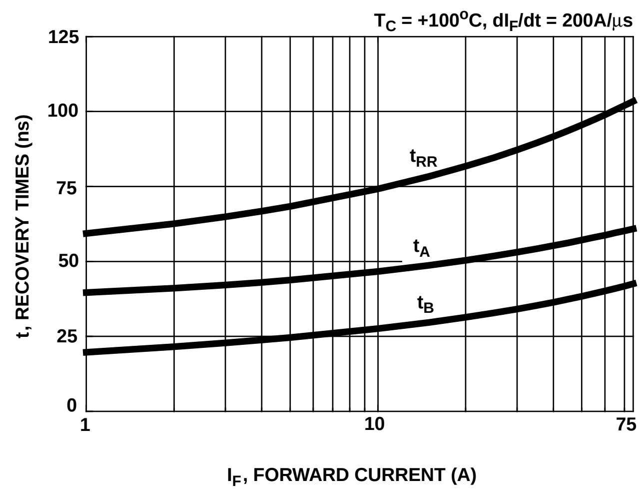


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +100°C

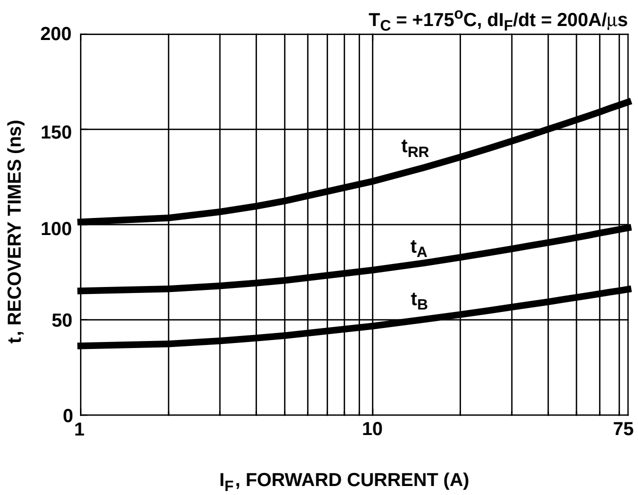


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +175°C

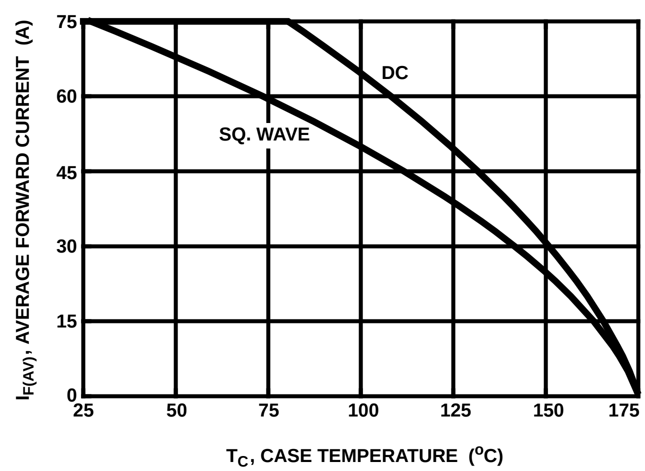


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

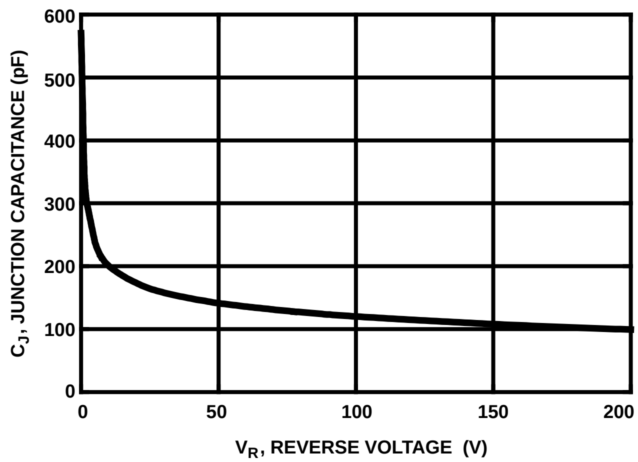


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuit and Waveforms

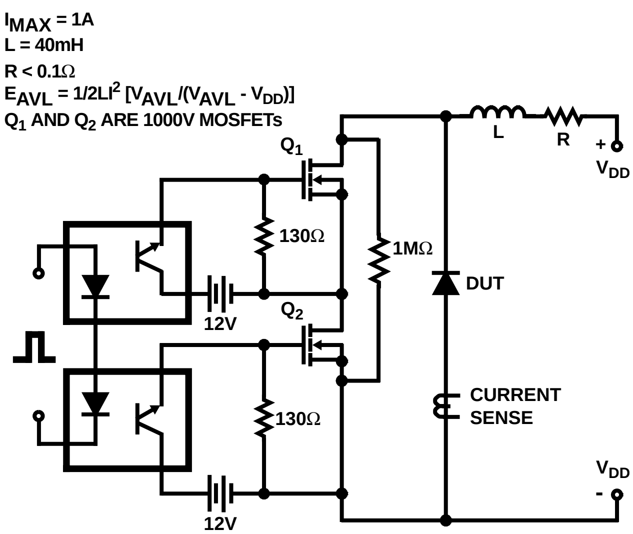


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

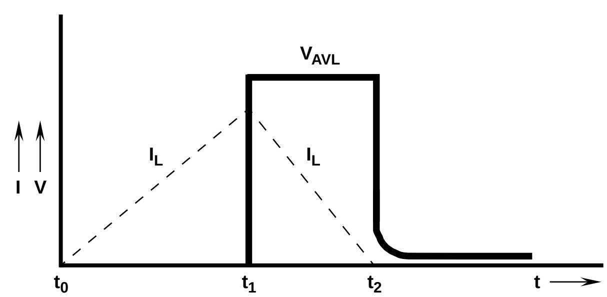


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS