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6A, 600V Hyperfast Diodes

The RHRD660 and RHRD660S are hyperfast diodes with soft recovery characteristics (t_{rr} < 30ns). 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.

Formerly developmental type TA49057.

Ordering Information

PART NUMBER	PACKAGE	BRAND
RHRD660	TO-251	RHR660
RHRD660S	TO-252	RHR660

NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-252 variant in tape and reel, e.g. RHRD660S9A.
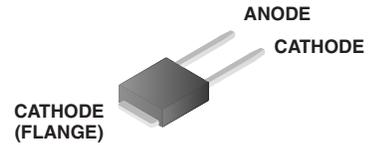
Symbol

Features

- Hyperfast with Soft Recovery . . . . <30ns
- Operating Temperature . . . . 175°C
- Reverse Voltage Up To 600V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Packaging

JEDEC STYLE TO-251

JEDEC STYLE TO-252

Absolute Maximum Ratings $T_C = 25^{o}$C, Unless Otherwise Specified

		RHRD660, RHRD660S	UNITS
Peak Repetitive Reverse Voltage	V_{RRM}	600	V
Working Peak Reverse Voltage	V_{RWM}	600	V
DC Blocking Voltage	V_R	600	V
Average Rectified Forward Current . . . . ($T_C = 152^{o}$C)	$I_{F(AV)}$	6	A
Repetitive Peak Surge Current . . . . (Square Wave, 20kHz)	I_{FRM}	12	A
Nonrepetitive Peak Surge Current . . . . (Halfwave, 1 Phase, 60Hz)	I_{FSM}	60	A
Maximum Power Dissipation	P_D	50	W
Avalanche Energy (See Figures 10 and 11)	E_{AVL}	10	mJ
Operating and Storage Temperature	T_{STG}, T_J	-65 to 175	^{o}C
Maximum Lead Temperature for Soldering (Leads at 0.063 in. (1.6mm) from case for 10s)	T_L	300	^{o}C
Package Body for 10s, see Tech Brief 334	T_{PKG}	260	^{o}C

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
V_F	I_F = 6A	-	-	2.1	V
	I_F = 6A, $T_C = 150^oC$	-	-	1.7	V
I_R	V_R = 600V	-	-	100	μA
	V_R = 600V, $T_C = 150^oC$	-	-	500	μA
t_{rr}	I_F = 1A, dI_F/dt = 200A/μs	-	-	30	ns
	I_F = 6A, dI_F/dt = 200A/μs	-	-	35	ns
t_a	I_F = 6A, dI_F/dt = 200A/μs	-	16	-	ns
t_b	I_F = 6A, dI_F/dt = 200A/μs	-	8.5	-	ns
Q_{RR}	I_F = 6A, dI_F/dt = 200A/μs	-	45	-	nC
C_J	V_R = 10V, I_F = 0A	-	20	-	pF
$R_{\theta JC}$		-	-	3	$^oC/W$

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300μs, D = 2%).

I_R = Instantaneous reverse current.

t_{rr} = Reverse recovery time (See Figure 9), summation of t_a + t_b.

t_a = Time to reach peak reverse current (See Figure 9).

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 9).

Q_{RR} = Reverse recovery charge.

C_J = Junction capacitance.

$R_{\theta JC}$ = Thermal resistance junction to case.

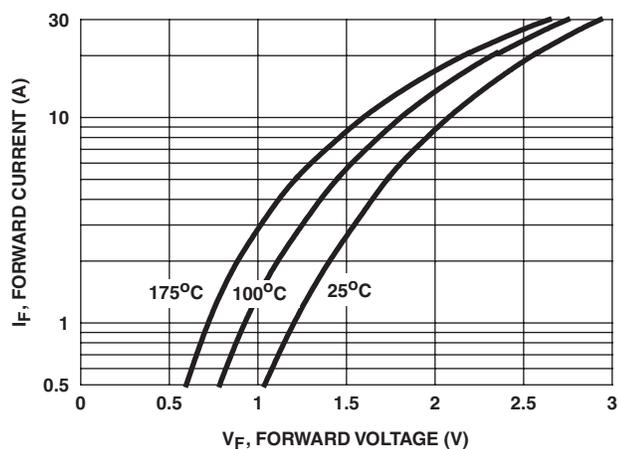pw = Pulse width.

D = Duty cycle.

Typical Performance Curves

FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE
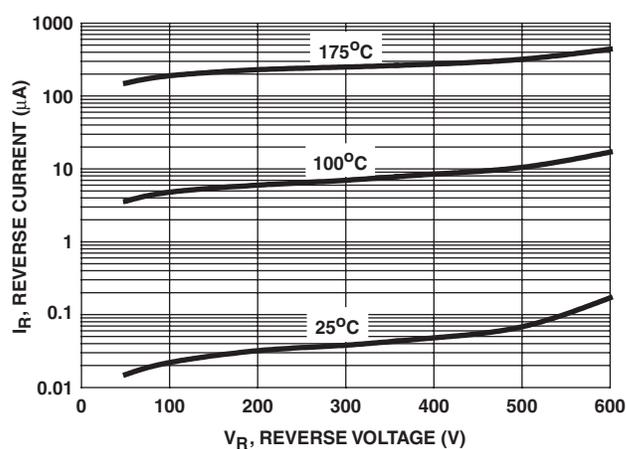

FIGURE 2. REVERSE CURRENT vs REVERSE
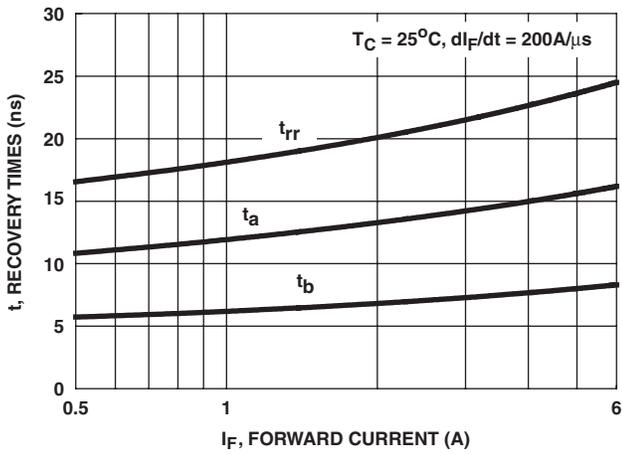
Typical Performance Curves (Continued)

FIGURE 3. t_{rr}, t_a AND t_b CURVES vs FORWARD CURRENT

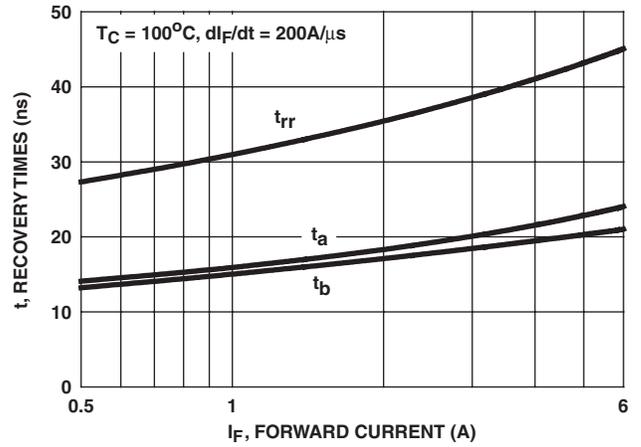
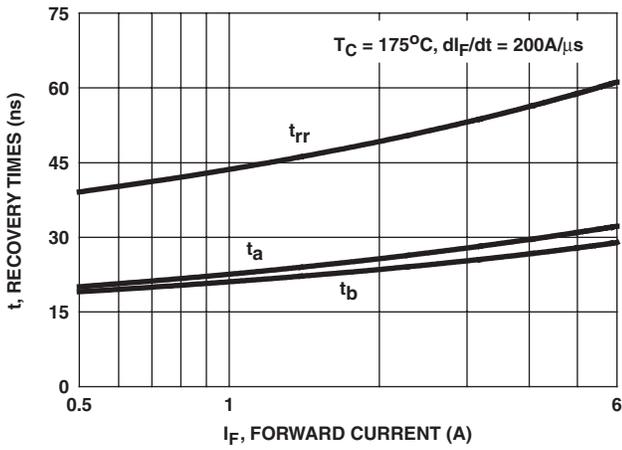FIGURE 4. t_{rr}, t_a AND t_b CURVES vs FORWARD CURRENT

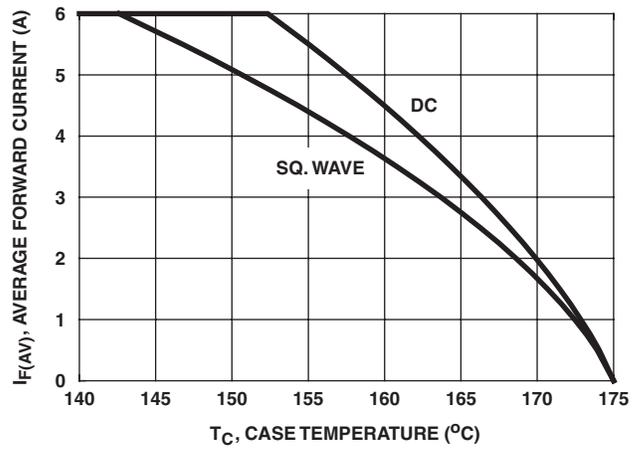FIGURE 5. t_{rr}, t_a AND t_b CURVES vs FORWARD CURRENT
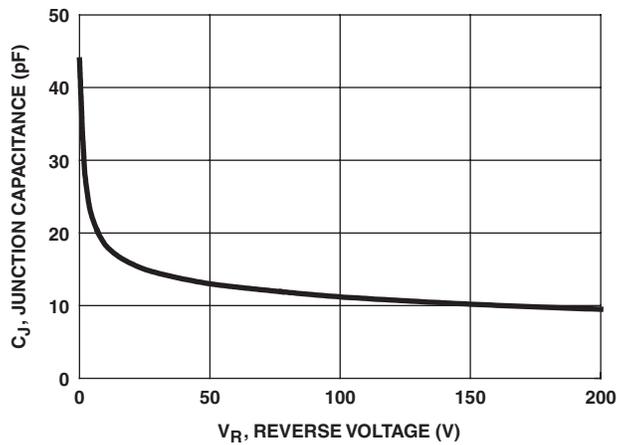

FIGURE 6. CURRENT DERATING CURVE

FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

V$_{GE}$ AMPLITUDE AND
R$_G$ CONTROL dI$_F$/dt
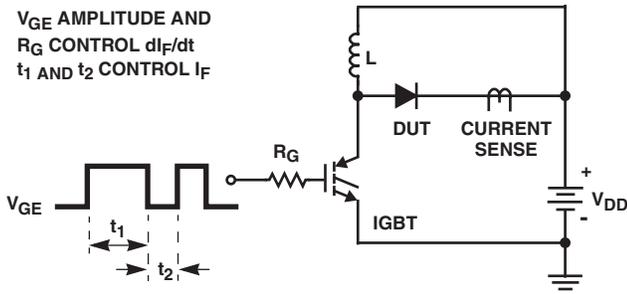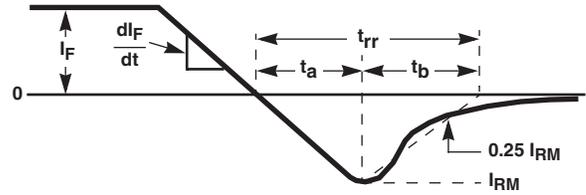t$_1$ AND t$_2$ CONTROL I$_F$

FIGURE 8. t$_{rr}$ TEST CIRCUIT

FIGURE 9. t$_{rr}$ WAVEFORMS AND DEFINITIONS

I$_{MAX}$ = 1A
L = 20mH
R < 0.1Ω
E$_{AVL}$ = 1/2LI^2 [V$_{R(AVL)}$/(V$_{R(AVL)}$ - V$_{DD}$)]
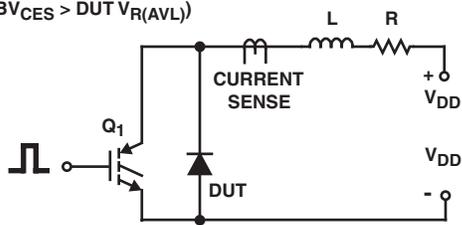Q$_1$ = IGBT (BV$_{CES}$ > DUT V$_{R(AVL)}$)
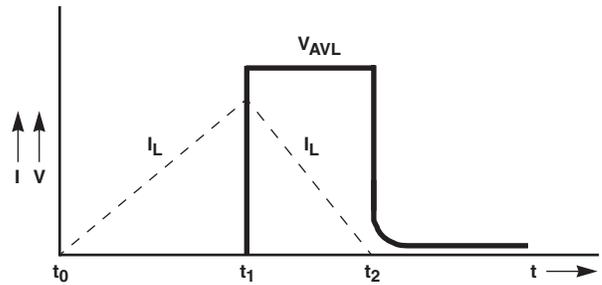

FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

FIGURE 11. AVALANCHE CURRENT AND VOLTAGE
WAVEFORMS

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No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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