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8A, 400V – 600V Hyperfast Diodes

The RHRP840 and RHRP860 are hyperfast diodes with soft recovery characteristics ($t_{rr} < 30\text{ns}$). 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.

Formerly developmental type TA49059.

Ordering Information

PART NUMBER	PACKAGE	BRAND
RHRP840	TO-220AC	RHRP840
RHRP860	TO-220AC	RHRP860

NOTE: When ordering, use the entire part number.

Symbol

K

Features

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

Applications

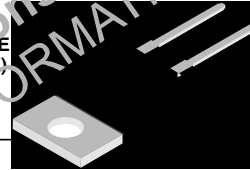
- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Packaging

JEDEC TO-220AC

ANODE

CATHODE

CATHODE
(FLANGE)**Absolute Maximum Ratings** $T_C = 25^\circ\text{C}$, Unless Otherwise Specified

	RHRP840	RHRP860	UNITS
Peak Repetitive Reverse Voltage. V _{RRM}	400	600	V
Working Peak Reverse Voltage V _{RWM}	400	600	V
DC Blocking Voltage V _R	400	600	V
Average Rectified Forward Current I _{F(AV)} ($T_C = 150^\circ\text{C}$)	8	8	A
Repetitive Peak Surge Current I _{FRM} (Square Wave, 20kHz)	16	16	A
Nonrepetitive Peak Surge Current. I _{FSM} (Halfwave, 1 Phase, 60Hz)	100	100	A
Maximum Power Dissipation P _D	75	75	W
Avalanche Energy (See Figures 10 and 11) E _{AVL}	20	20	mJ
Operating and Storage Temperature T _{STG} , T _J	-65 to 175	-65 to 175	°C

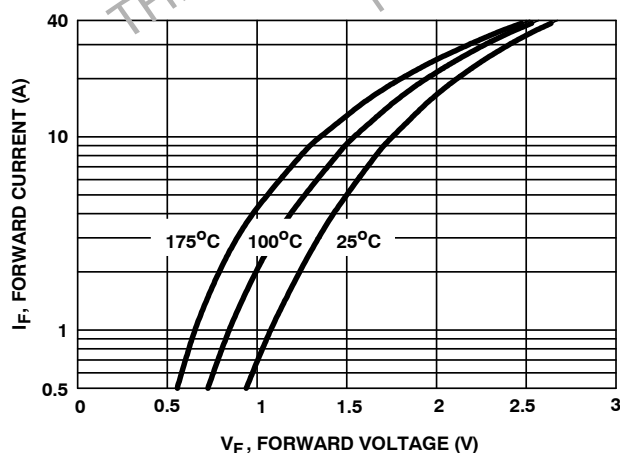
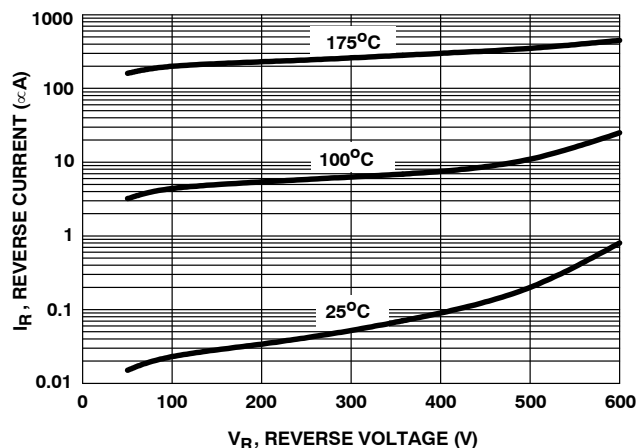
Electrical Specifications $T_C = 25^\circ\text{C}$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	RHRP840			RHRP860			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 8\text{A}$	–	–	2.1	–	–	2.1	V
	$I_F = 8\text{A}$, $T_C = 150^\circ\text{C}$	–	–	1.7	–	–	1.7	V
I_R	$V_R = 400\text{V}$	–	–	100	–	–	–	μA
	$V_R = 600\text{V}$	–	–	–	–	–	100	μA
	$V_R = 400\text{V}$, $T_C = 150^\circ\text{C}$	–	–	500	–	–	–	μA
	$V_R = 600\text{V}$, $T_C = 150^\circ\text{C}$	–	–	–	–	–	500	μA
t_{rr}	$I_F = 1\text{A}$, $dI_F/dt = 200\text{A}/\mu\text{s}$	–	–	30	–	–	30	ns
	$I_F = 8\text{A}$, $dI_F/dt = 200\text{A}/\mu\text{s}$	–	–	35	–	–	35	ns
t_a	$I_F = 8\text{A}$, $dI_F/dt = 200\text{A}/\mu\text{s}$	–	18	–	–	8	–	ns
t_b	$I_F = 8\text{A}$, $dI_F/dt = 200\text{A}/\mu\text{s}$	–	10	–	–	10	–	ns
Q_{RR}	$I_F = 8\text{A}$, $dI_F/dt = 200\text{A}/\mu\text{s}$	–	56	–	–	56	–	nC
C_J	$V_R = 10\text{V}$, $I_F = 0\text{A}$	–	25	–	–	25	–	pF
$R_{\theta JC}$		–	–	2	–	–	2	$^\circ\text{C}/\text{W}$

DEFINITIONS V_F = Instantaneous forward voltage (pw = 300 μs , 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 VOLTAGE**

Typical Performance Curves (Continued)

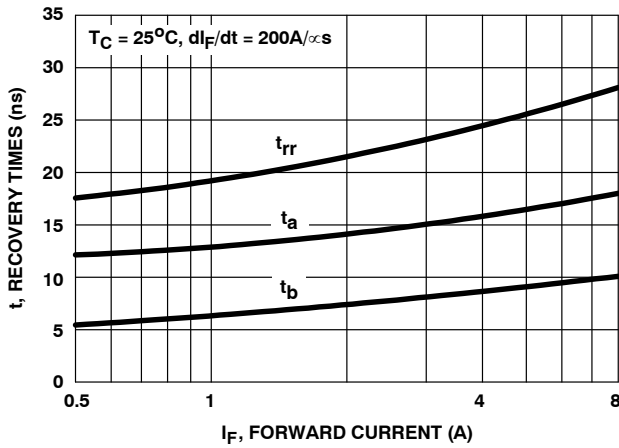


FIGURE 3. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

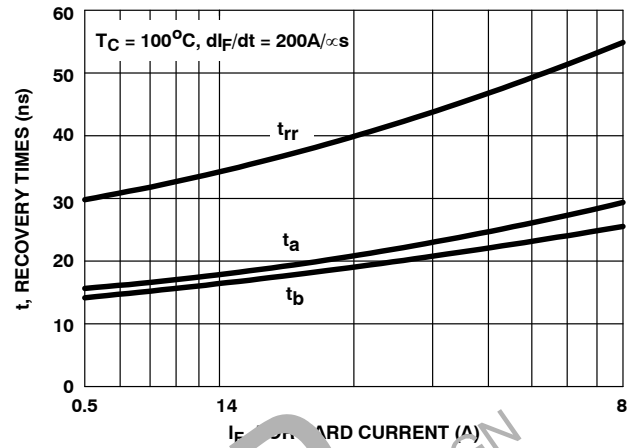


FIGURE 4. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

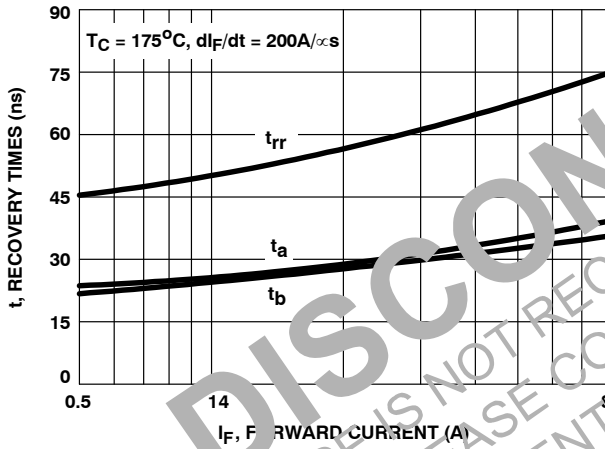


FIGURE 5. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

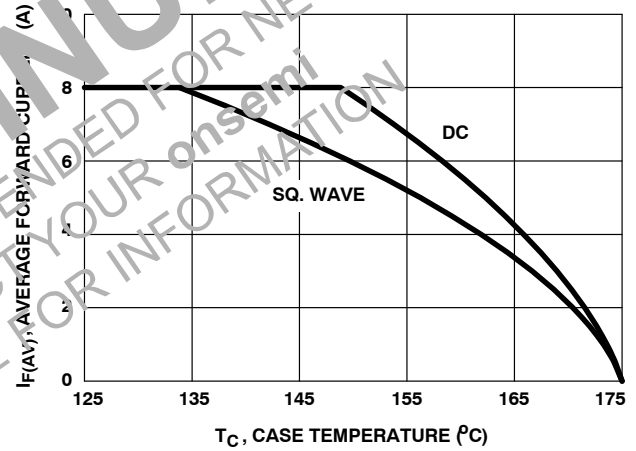


FIGURE 6. CURRENT DERATING CURVE

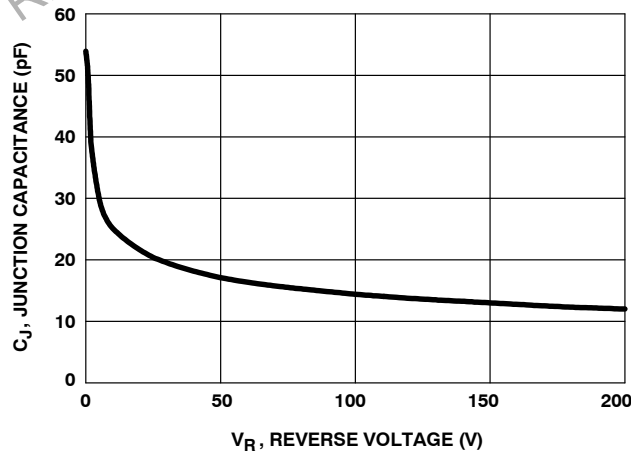


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

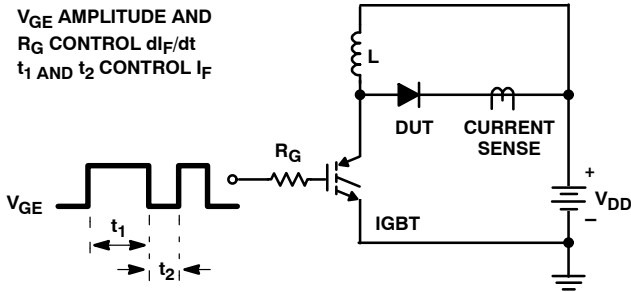


FIGURE 8. t_{rr} TEST CIRCUIT

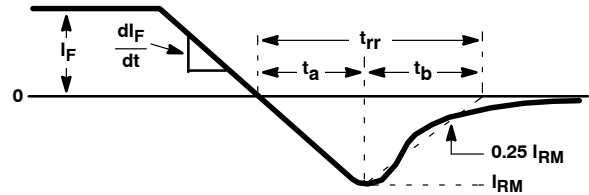


FIGURE 9. t_{rr} WAVEFORMS AND DEFINITIONS

$I_{MAX} = 1A$
 $L = 40mH$
 $R < 0.1\Omega$
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$
 $Q_1 = IGBT (BV_{CES} > DUT V_{R(AVL)})$

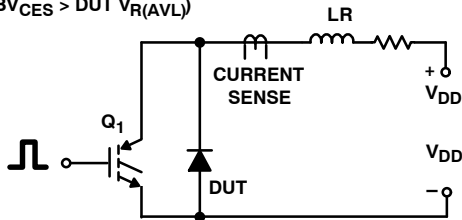


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

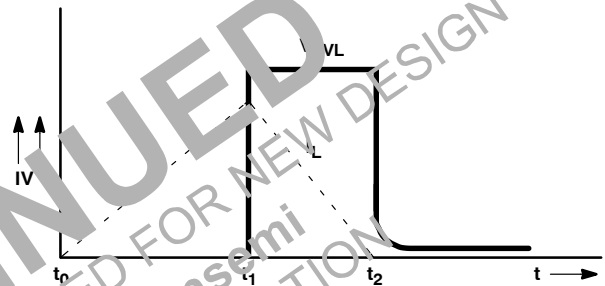


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS



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