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# onsemi™

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ON Semiconductor®

# RHRP3060

## 30 A, 600 V Hyperfast Diodes

### Features

- Hyperfast Recovery  $t_{rr} = 45 \text{ ns}$  (@  $I_F = 30 \text{ A}$ )
- Max Forward Voltage,  $V_F = 2.1 \text{ V}$  (@  $T_C = 25^\circ\text{C}$ )
- 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS Compliant

### Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

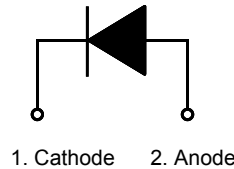
### Ordering Informations

Part Number	Package	Band
RHRP3060	TO-220AC	RHRP3060

### Description

The RHRP3060 is a hyperfast diode with soft recovery characteristics. It has the half recovery time of ultrafast diodes and is silicon nitride passivated ion implanted epitaxial planar construction. These diodes are intended to be used as freewheeling clamping diodes and diodes 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.

### Pin Assignments



### Absolute Maximum Ratings

Symbol	Parameter	RHRP3060	Unit
$V_{RRM}$	Peak Repetitive Reverse Voltage	600	V
$V_{RWM}$	Working Peak Reverse Voltage	600	V
$V_R$	DC Blocking Voltage	600	V
$I_{F(AV)}$	Average Rectified Forward Current ( $T_C = 120^\circ\text{C}$ )	30	A
$I_{FRM}$	Repetitive Peak Surge Current (Square Wave, 20KHz)	70	A
$I_{FSM}$	Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60Hz)	325	A
$P_D$	Maximum Power Dissipation	125	W
$E_{AVL}$	Avalanche Energy (See Figures 10 and 11)	20	mJ
$T_J, T_{STG}$	Operating and Storage Temperature	-65 to 175	$^\circ\text{C}$

RHRP3060 — Hyperfast Diode

**Electrical Characteristics**  $T_C = 25^\circ\text{C}$  unless otherwise noted

Symbol	Test Conditions	RHRP3060			Unit
		Min.	Typ.	Max.	
$V_F$	$I_F = 30\text{ A}$	-	-	2.1	V
	$I_F = 30\text{ A}, T_C = 150^\circ\text{C}$	-	-	1.7	V
$I_R$	$V_R = 400\text{ V}$	-	-	-	$\mu\text{A}$
	$V_R = 600\text{ V}$	-	-	250	$\mu\text{A}$
	$V_R = 400\text{ V}, T_C = 150^\circ\text{C}$	-	-	-	mA
	$V_R = 600\text{ V}, T_C = 150^\circ\text{C}$	-	-	1.0	mA
$t_{rr}$	$I_F = 1\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	-	40	ns
	$I_F = 30\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	-	45	ns
$t_a$	$I_F = 30\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	22	-	ns
$t_b$	$I_F = 30\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	18	-	ns
$Q_{RR}$	$I_F = 30\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	100	-	nC
$C_J$	$V_R = 600\text{ V}, I_F = 0\text{ A}$	-	5	-	pF
$R_{\theta JC}$		-	-	1.2	$^\circ\text{C}/\text{W}$

**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 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.

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Typical Performance Characteristics

Figure 1. Forward Current vs Forward Voltage

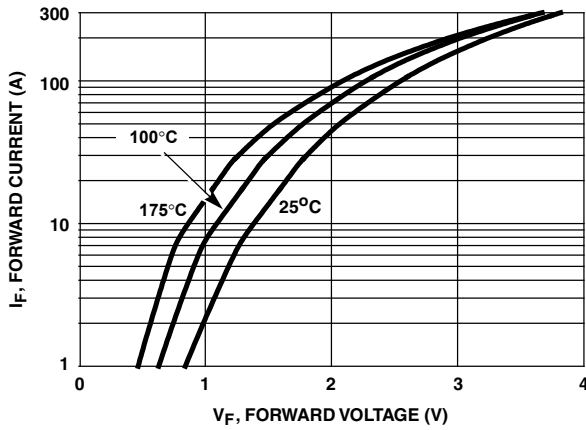


Figure 2. Reverse Current vs Reverse Voltage

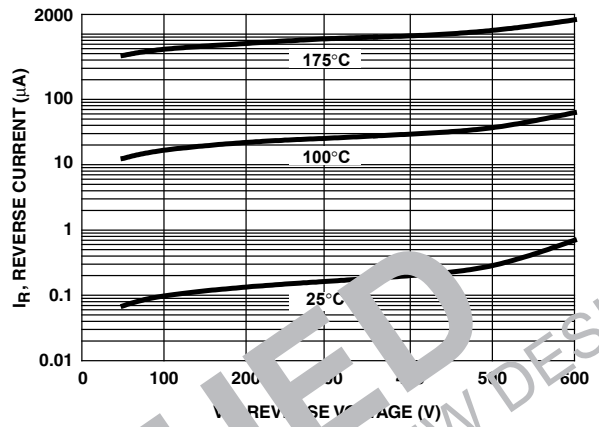


Figure 3.  $t_{rr}$ ,  $t_a$  and  $t_b$  Curves vs Forward Current

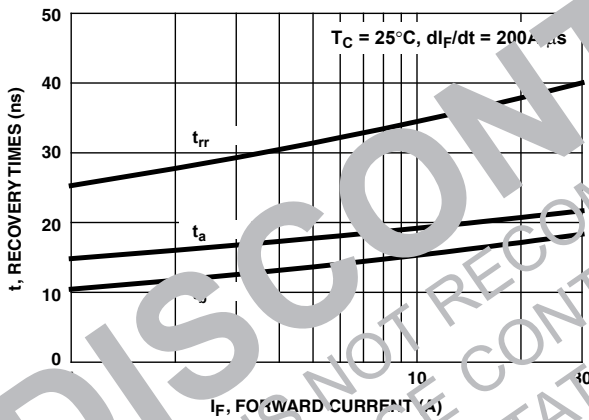


Figure 4.  $t_{rr}$ ,  $t_a$  and  $t_b$  Curves vs Forward Current

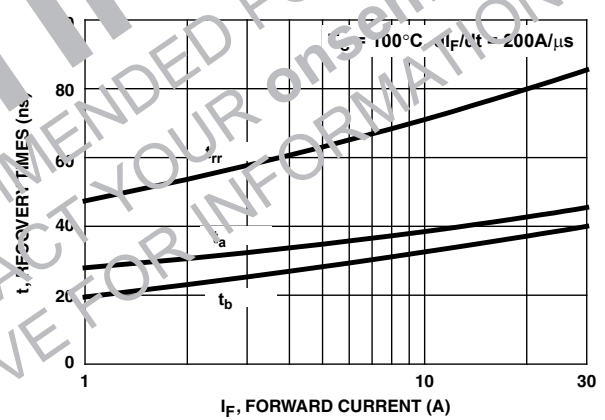


Figure 5.  $t_{rr}$ ,  $t_a$  and  $t_b$  Curves vs Forward Current

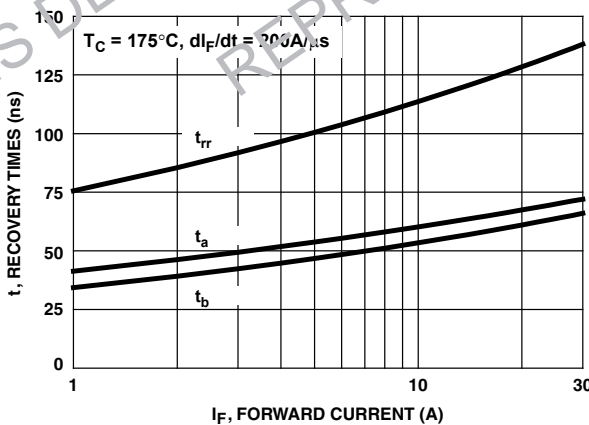
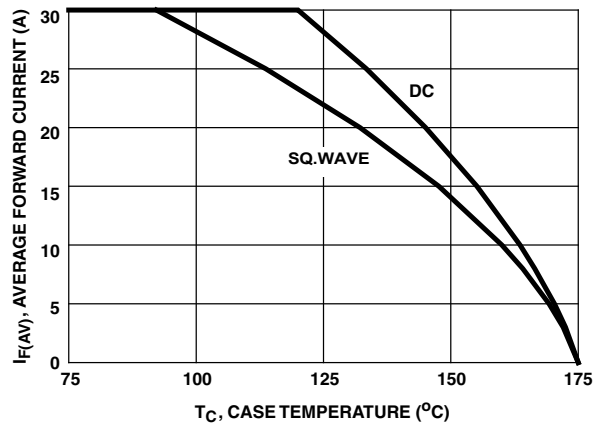
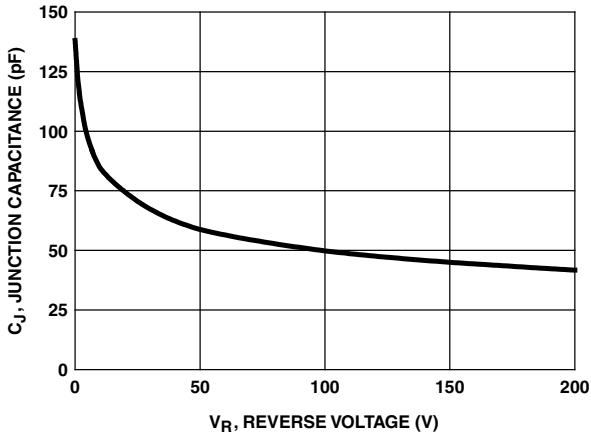


Figure 6. Current Derating Curve



Typical Performance Characteristics (Continued)

Figure 7. Junction Capacitance vs Reverse Voltage



Test Circuit and Waveforms

Figure 8.  $t_{rr}$  Test Circuit

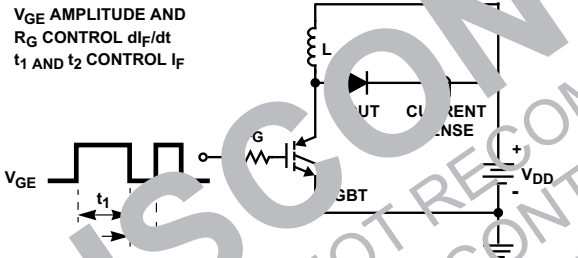


Figure 9.  $t_{rr}$  Waveforms and Definitions

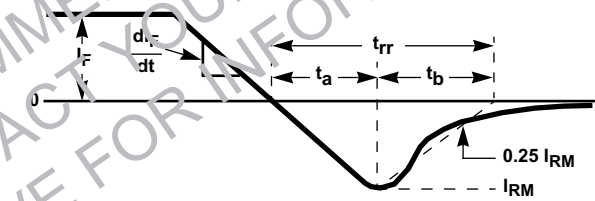


Figure 10. Avalanche Energy Test Circuit

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

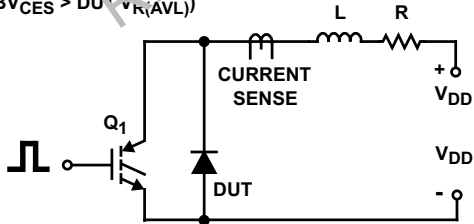
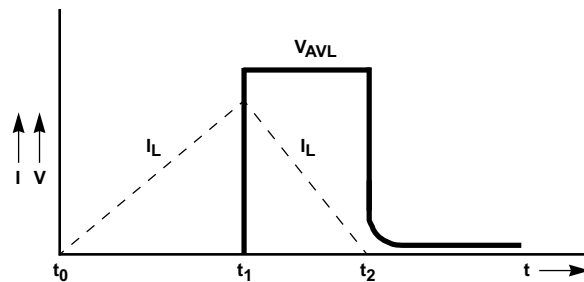



Figure 11. Avalanche Current and Voltage Waveforms



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