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**30 A, 400 V - 600 V,
Hyperfast Diode**

Description

The RHRG3040, RHRG3060 is a hyperfast diode with soft recovery characteristics. It has the half recovery time of ultrafast diodes and is silicon nitride passivated ionimplanted epitaxial planar construction. These devices 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.

Ordering Information

PART NUMBER	PACKAGE	BRAND
RHRG3040	TO-247	RHRG3040
RHRG3060	TO-247	RHRG3060

NOTE: When ordering, use the entire part number.

Symbol



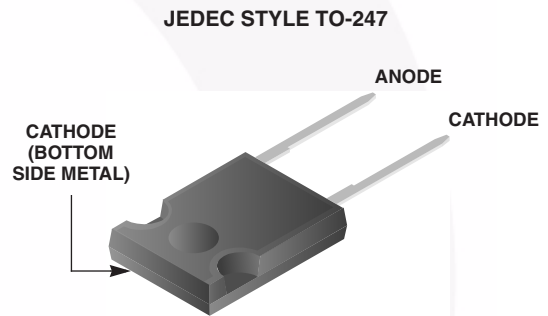
Features

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

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Packaging



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

	RHRG3040	RHRG3060	UNIT
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 ($T_C = 120^\circ\text{C}$)	$I_{F(AV)}$ 30	30	A
Repetitive Peak Surge Current (Square Wave, 20 kHz)	I_{FRM} 70	70	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60 Hz)	I_{FSM} 325	325	A
Maximum Power Dissipation	P_D 125	125	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	$^\circ\text{C}$

RHRG3040, RHRG3060

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

SYMBOL	TEST CONDITION	RHRG3040			RHRG3060			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 30\text{ A}$	-	-	2.1	-	-	2.1	V
	$I_F = 30\text{ A}, T_C = 150^\circ\text{C}$	-	-	1.7	-	-	1.7	V
I_R	$V_R = 400\text{ V}$	-	-	250	-	-	-	μA
	$V_R = 600\text{ V}$	-	-	-	-	-	250	μA
	$V_R = 400\text{ V}, T_C = 150^\circ\text{C}$	-	-	1.0	-	-	-	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	-	-	40	ns
	$I_F = 30\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	-	45	-	-	45	ns
t_a	$I_F = 30\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	22	-	-	22	-	ns
t_b	$I_F = 30\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	18	-	-	18	-	ns
Q_{rr}	$I_F = 30\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	100	-	-	100	-	nC
C_J	$V_R = 10\text{ V}, I_F = 0\text{ A}$	-	85	-	-	85	-	pF
$R_{\theta JC}$		-	-	1.2	-	-	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.

Typical Performance Curves

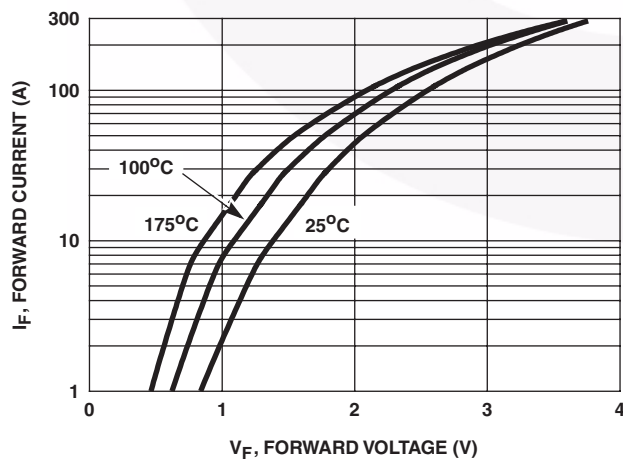


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

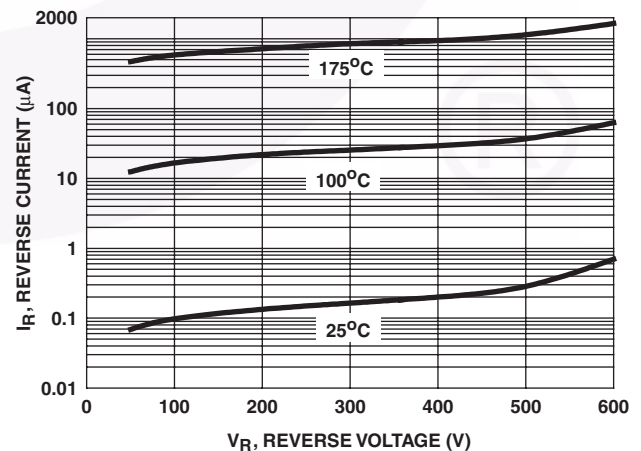


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

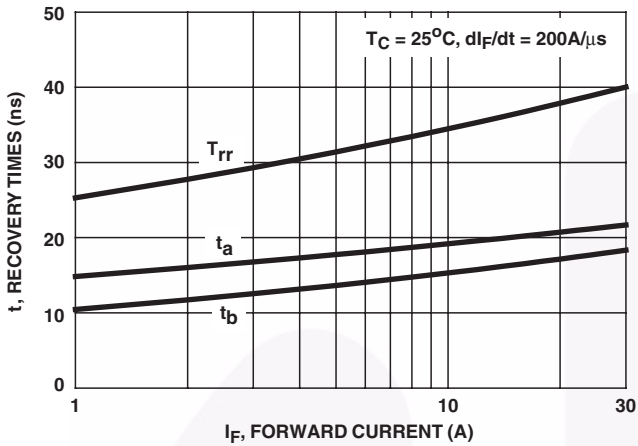


FIGURE 3. T_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

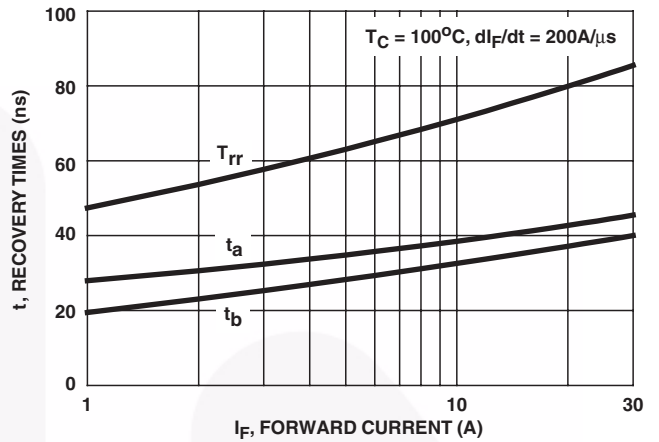


FIGURE 4. T_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

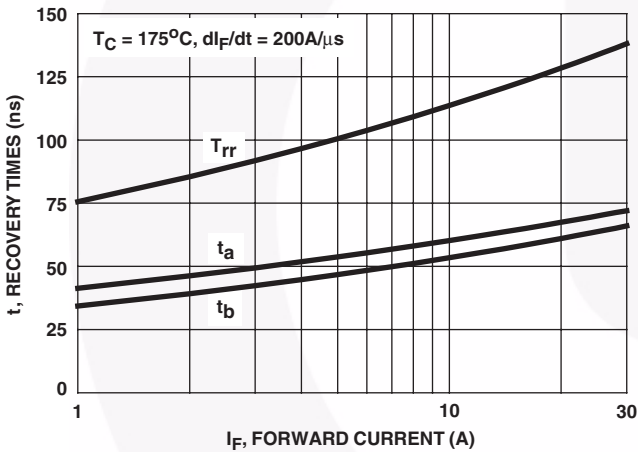


FIGURE 5. T_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

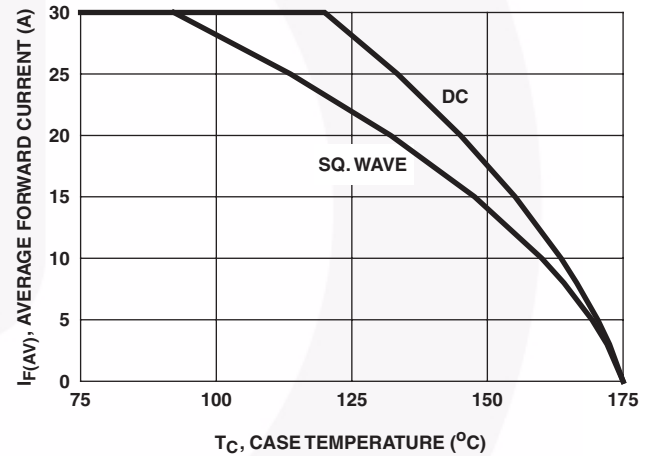


FIGURE 6. CURRENT DERATING CURVE

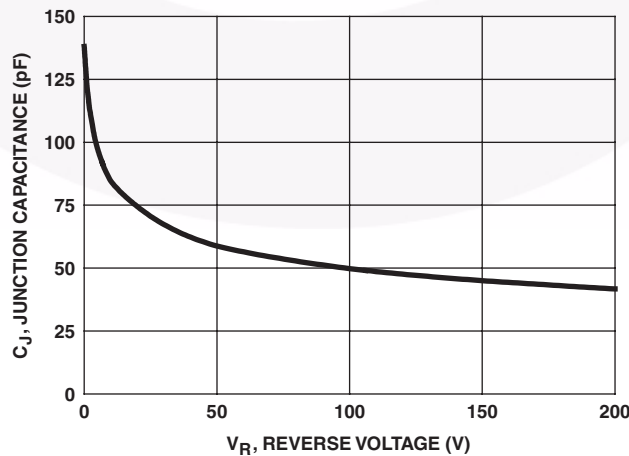


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

V_{GE} AMPLITUDE AND
 R_G CONTROL di_F/dt
 t_1 AND t_2 CONTROL I_F

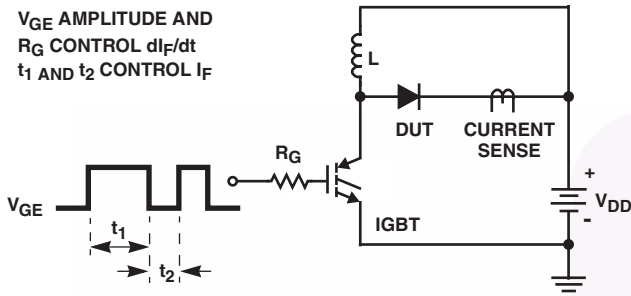


FIGURE 8. T_{rr} TEST CIRCUIT

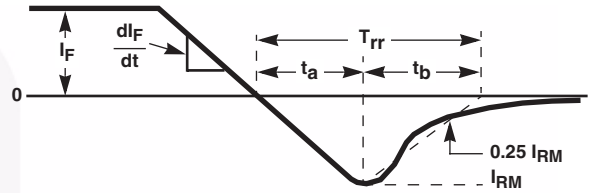


FIGURE 9. T_{rr} WAVEFORMS AND DEFINITIONS

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

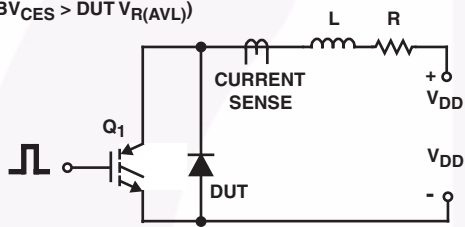


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

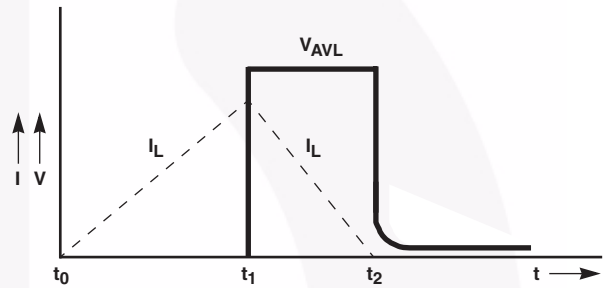
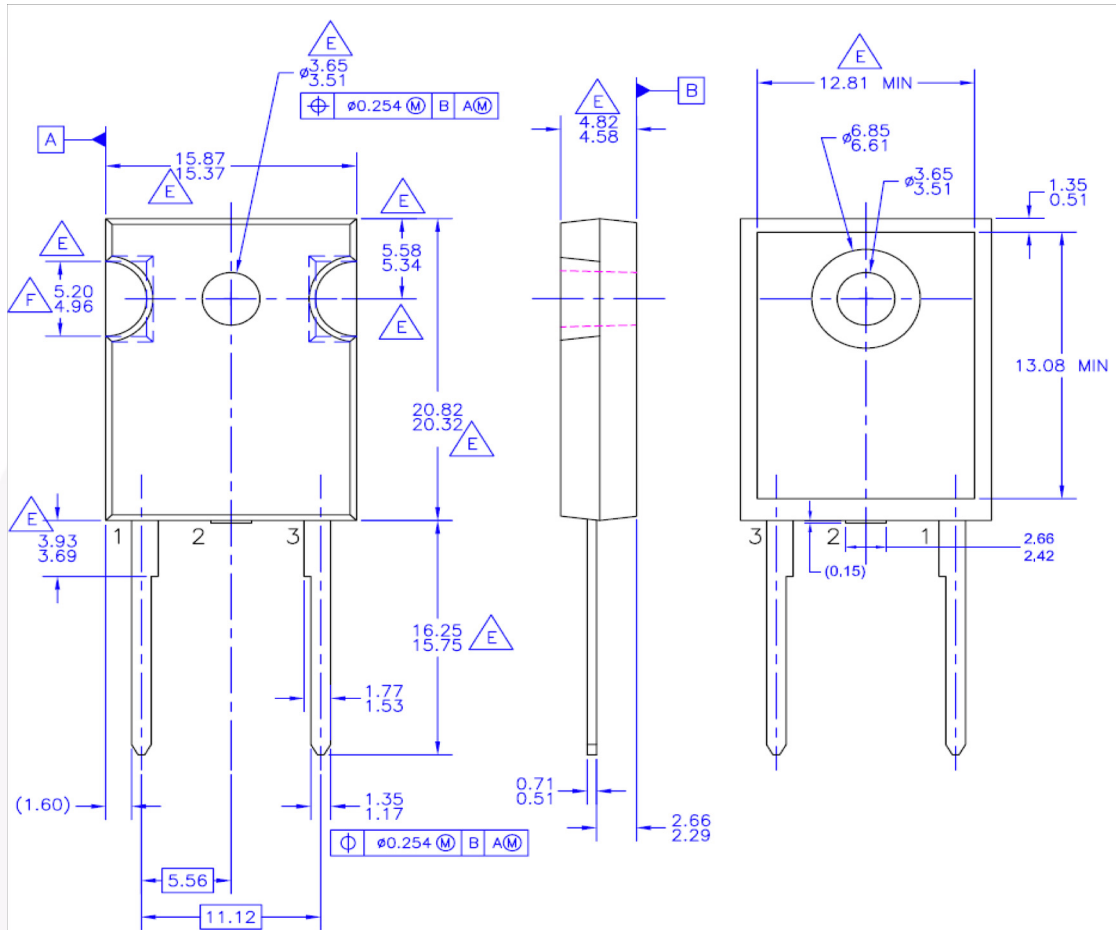


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Mechanical Dimensions

TO247-2L



- NOTES: UNLESS OTHERWISE SPECIFIED
- A. PACKAGE REFERENCE: JEDEC TO-247, ISSUE E, VARIATION AB, DATED JUNE, 2004.
 - B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
 - C. ALL DIMENSIONS ARE IN MILLIMETERS.
 - D. DRAWING CONFORMS TO ASME Y14.5 - 1994
- E.** DOES NOT COMPLY JEDEC STANDARD VALUE
- F.** NOTCH MAY BE SQUARE
- G.** DRAWING FILENAME: MKT-TO247B02_REV02

Figure 12. TO-247, Molded, 2LD, Jedec Option AB

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