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February 2017

RHRG1540CC, RHRG1560CC — Hyperfast Dual Diode

# RHRG1540CC, RHRG1560CC

## 30 A, 400 V - 600 V Hyperfast Dual Diode

### Description

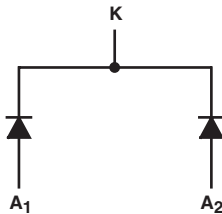
The RHRG1540CC, RHRG1560CC is a hyperfast dual diode with soft recovery characteristics. It has the half recovery time of ultrafast diodes and is silicon nitride passivated ionimplanted epitaxial planar construction. These devices are intended to be used as freewheeling/clamping diodes and diodes in 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
RHRG1540CC	TO-247-3L	RHRG1540C
RHRG1560CC	TO-247-3L	RHRG1560C

NOTE: When ordering, use the entire part number.

### Symbol



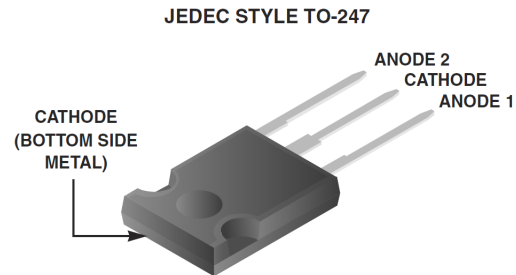
### Features

- Hyperfast Recovery  $t_{rr} = 40 \text{ ns}$  (@  $I_F = 15 \text{ A}$ )
- 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 (Per Leg) $T_C = 25^\circ\text{C}$ , Unless Otherwise Specified

	RHRG1540CC	RHRG1560CC	UNITS
Peak Repetitive Reverse Voltage . . . . .	400	600	V
Working Peak Reverse Voltage . . . . .	400	600	V
DC Blocking Voltage . . . . .	400	600	V
Average Rectified Forward Current . . . . . ( $T_C = 140^\circ\text{C}$ )	15	15	A
Repetitive Peak Surge Current . . . . . (Square Wave, 20 kHz)	30	30	A
Nonrepetitive Peak Surge Current . . . . . (Halfwave, 1 Phase, 60 Hz)	200	200	A
Maximum Power Dissipation . . . . .	100	100	W
Avalanche Energy (See Figure 10 and 11) . . . . .	20	20	mJ
Operating and Storage Temperature . . . . .	-65 to 175	-65 to 175	$^\circ\text{C}$

**Electrical Specifications** (Per Leg)  $T_C = 25^\circ\text{C}$ , Unless Otherwise Specified

SYMBOL	TEST CONDITION	RHRG1540CC			RHRG1560CC			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
$V_F$	$I_F = 15\text{ A}$	-	-	2.1	-	-	2.1	V
	$I_F = 15\text{ A}, T_C = 150^\circ\text{C}$	-	-	1.7	-	-	1.7	V
$I_R$	$V_R = 400\text{ V}$	-	-	100	-	-	-	$\mu\text{A}$
	$V_R = 600\text{ V}$	-	-	-	-	-	100	$\mu\text{A}$
	$V_R = 400\text{ V}, T_C = 150^\circ\text{C}$	-	-	500	-	-	-	$\mu\text{A}$
	$V_R = 600\text{ V}, T_C = 150^\circ\text{C}$	-	-	-	-	-	500	$\mu\text{A}$
$t_{rr}$	$I_F = 1\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$	-	-	35	-	-	35	ns
	$I_F = 15\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$	-	-	40	-	-	40	ns
$t_a$	$I_F = 15\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$	-	20	-	-	20	-	ns
$t_b$	$I_F = 15\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$	-	15	-	-	15	-	ns
$Q_{rr}$	$I_F = 15\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$	-	40	-	-	40	-	nC
$C_J$	$V_R = 10\text{ V}, I_F = 0\text{ A}$	-	60	-	-	60	-	pF
$R_{\theta JC}$		-	-	1.5	-	-	1.5	$^\circ\text{C}/\text{W}$

**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.

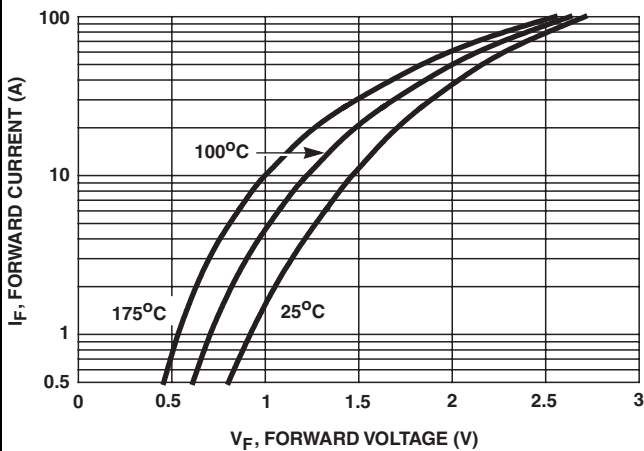
$C_J$  = Junction Capacitance.

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

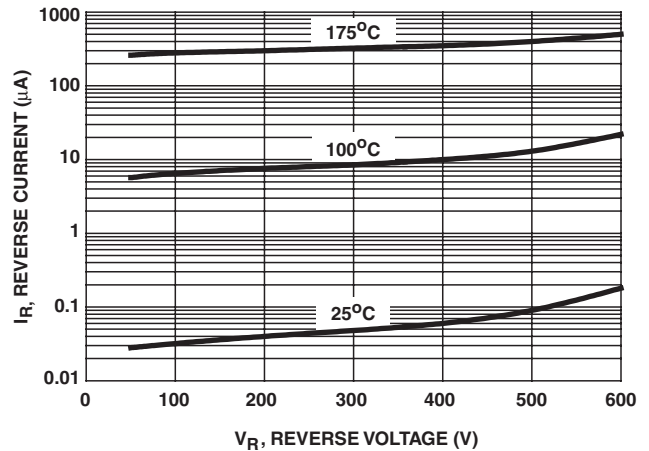
pw = pulse width.

D = duty cycle.

**Typical Performance Curves**



**FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE**



**FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE**

**Typical Performance Curves** (Continued)

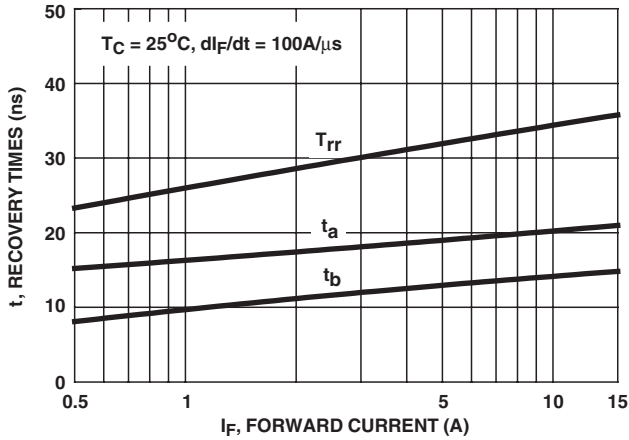


FIGURE 3.  $T_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

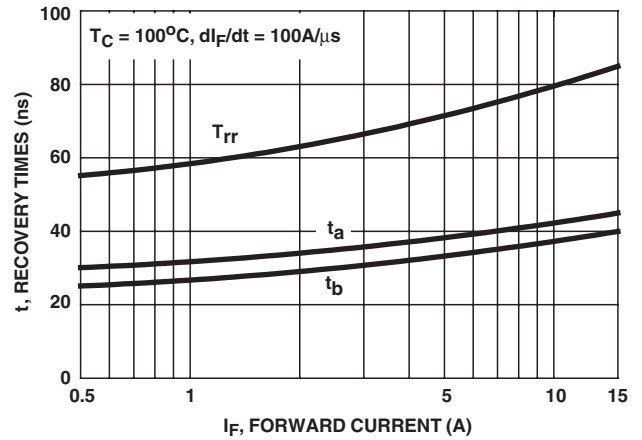


FIGURE 4.  $T_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

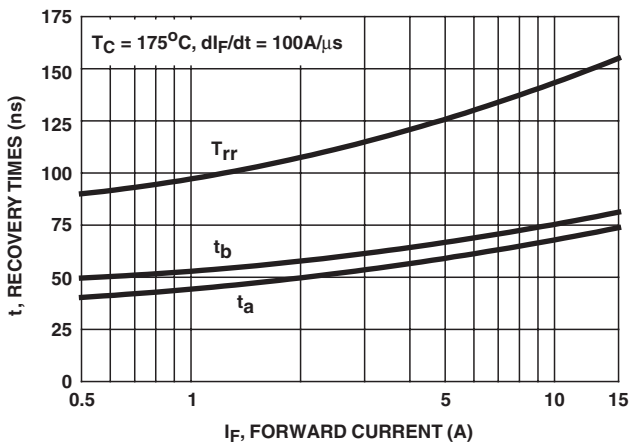


FIGURE 5.  $T_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

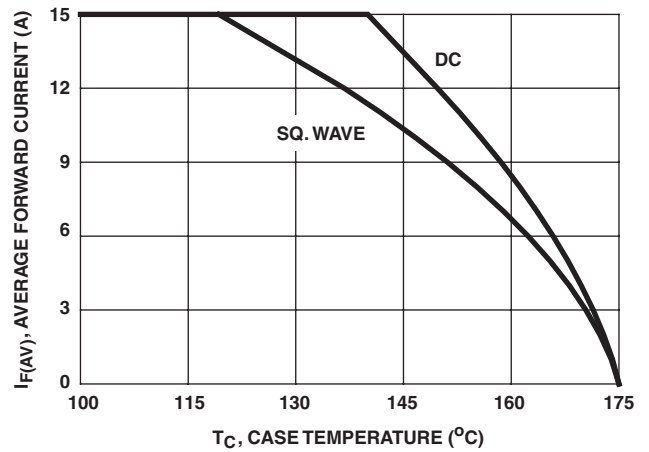


FIGURE 6. CURRENT DERATING CURVE

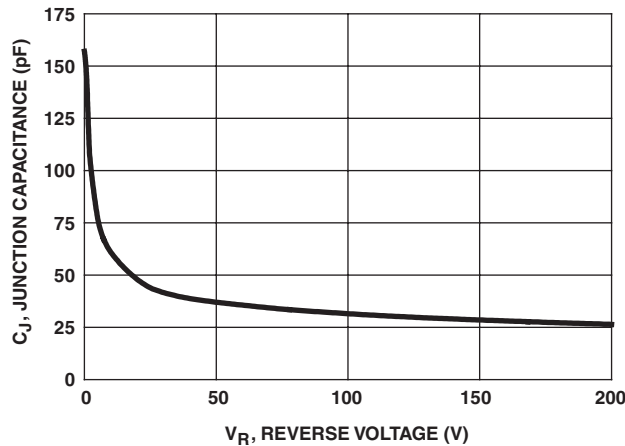


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

### Test Circuits and Waveforms

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

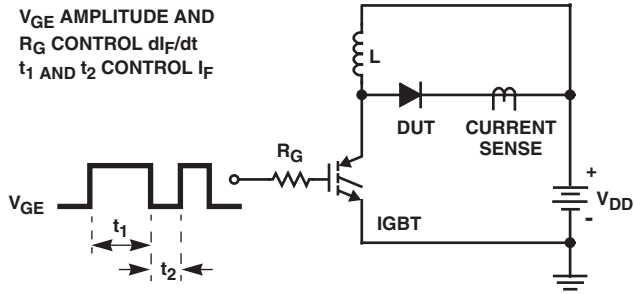


FIGURE 8.  $T_{rr}$  TEST CIRCUIT

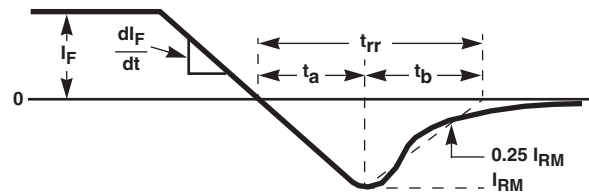


FIGURE 9.  $T_{rr}$  WAVEFORMS AND DEFINITIONS

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

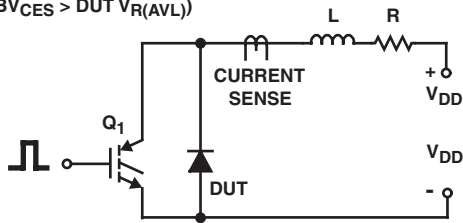


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

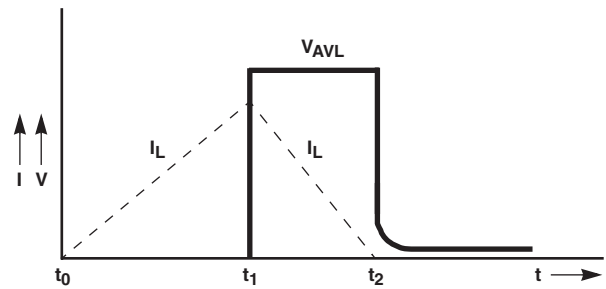
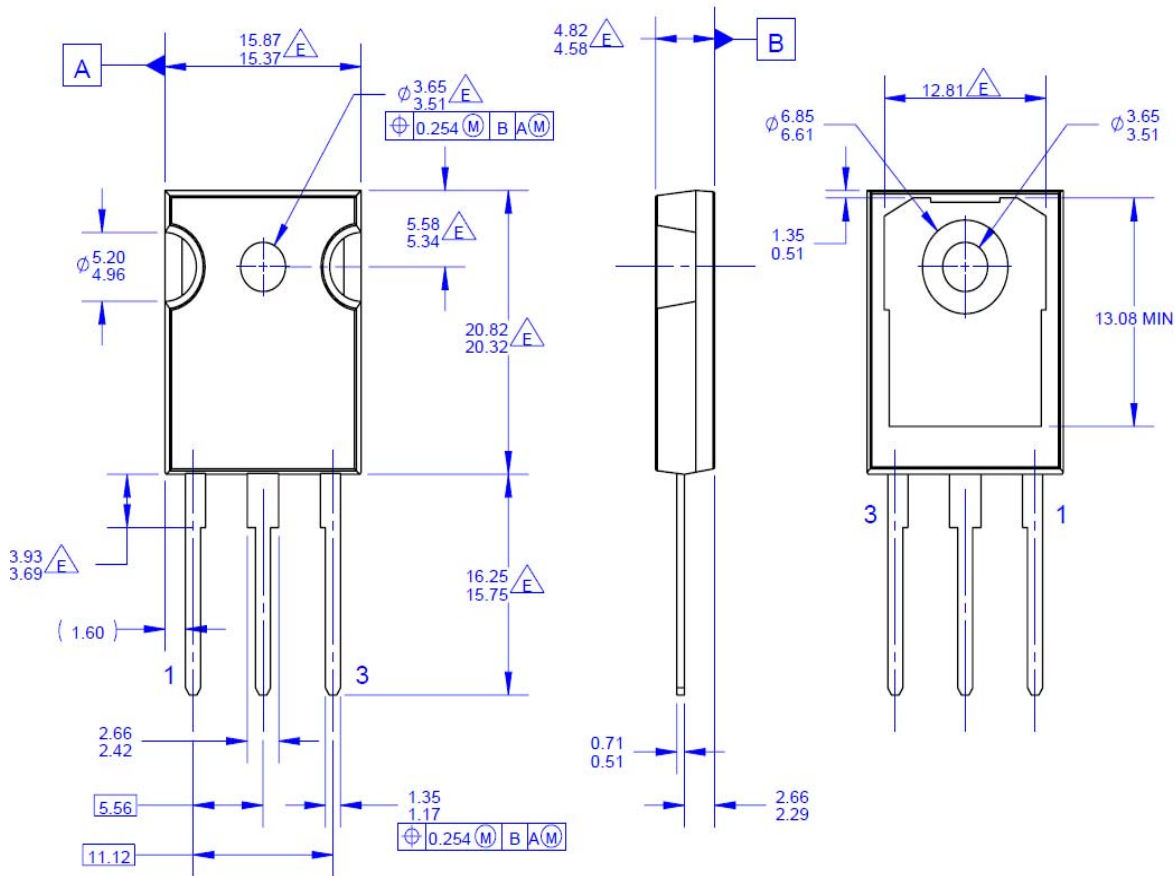


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

## Package Dimensions



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. DRAWING FILENAME: MKT-TO247A03\_REV03

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