

# 15 A, 600 V Hyperfast Rectifier

## RHRG1560CC-F085



ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

### Max Ratings (600 V, 15 A)

The RHRG1560CC-F085 is an Hyperfast diode with soft recovery characteristics ( $t_{rr} < 55$  ns). It has half the recovery time of ultrafast diode and is of silicon nitride passivated ion-implanted epitaxial planar construction. This device is intended for use as a freewheeling/clamping diode and rectifier in a variety of automotive switching power supplies and other power switching automotive applications.

Its low stored charge and hyperfast soft recovery minimize ringing and electrical noise in many power switching circuits, thus reducing power loss in the switching transistors.

### Features

- High Speed Switching ( $t_{rr} = 26$  ns(Typ.) @  $I_F = 15$  A)
- Low Forward Voltage ( $V_F = 1.86$  V(Typ.) @  $I_F = 15$  A)
- Avalanche Energy Rated
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

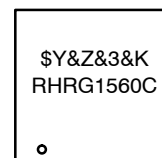
### Applications

- Switching Power Supply
- Power Switching Circuits
- Automotive and General Purpose



TO-247-3LD  
CASE 340CK

### MARKING DIAGRAM



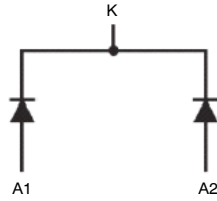
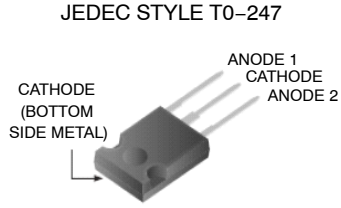
|           |                         |
|-----------|-------------------------|
| RHRG1560C | = Specific Device Code  |
| \$Y       | = ON Semiconductor Logo |
| &Z        | = Assembly Lot Code     |
| &3        | = Numeric Date Code     |
| &K        | = Assembly Location     |

### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

# RHRG1560CC-F085

## PIN ASSIGNMENTS



### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ Unless Otherwise Noted)

| Symbol         | Parameter  | Ratings      | Units            |
|----------------|--|--------------|------------------|
| $V_{RRM}$      | 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 @ $T_C = 25^\circ\text{C}$ | 15           | A                |
| $I_{FSM}$      | Non-repetitive Peak Surge Current (Halfwave 1 Phase 50 Hz)   | 45           | A                |
| $E_{AVL}$      | Avalanche Energy (1 A, 40 mH)                                | 20           | mJ               |
| $T_J, T_{STG}$ | Operating Junction and Storage Temperature                   | - 55 to +175 | $^\circ\text{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ Unless Otherwise Noted)

| Symbol          | Parameter                                       | Max  | Units                     |
|-----------------|---|------|---------------------------|
| $R_{\theta JC}$ | Maximum Thermal Resistance, Junction to Case    | 1.37 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Maximum Thermal Resistance, Junction to Ambient | 45   | $^\circ\text{C}/\text{W}$ |

### PACKAGE MARKING AND ORDERING INFORMATION

| Device Marking | Device          | Package | Tube | Quantity |
|----------------|-----------------|---------|------|----------|
| RHRG1560C      | RHRG1560CC-F085 | TO-247  | -    | 30       |

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ Unless Otherwise Noted)

| Symbol               | Parameter                     | Conditions   | Min.                      | Typ. | Max  | Units |               |
|----------------------|-------------------------------|--|---------------------------|------|------|-------|---------------|
| $I_R$                | Instantaneous Reverse Current | $V_R = 600\text{ V}$   | $T_C = 25^\circ\text{C}$  | -    | -    | 100   | $\mu\text{A}$ |
|                      |                               |  | $T_C = 175^\circ\text{C}$ | -    | -    | 1000  | $\mu\text{A}$ |
| $V_{FM}$<br>(Note 1) | Instantaneous Forward Voltage | $I_F = 15\text{ A}$  | $T_C = 25^\circ\text{C}$  | -    | 1.86 | 2.3   | V             |
|                      |                               |  | $T_C = 175^\circ\text{C}$ | -    | 1.28 | 1.6   | V             |
| $t_{rr}$<br>(Note 2) | Reverse Recovery Time         | $I_F = 1\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, V_{CC} = 390\text{ V}$  | $T_C = 25^\circ\text{C}$  | -    | 25   | 50    | ns            |
|                      |                               | $I_F = 15\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, V_{CC} = 390\text{ V}$ | $T_C = 25^\circ\text{C}$  | -    | 26   | 55    | ns            |
|                      |                               |  | $T_C = 175^\circ\text{C}$ | -    | 137  | -     | ns            |
| $t_a$                | Reverse Recovery Time         | $I_F = 15\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, V_{CC} = 390\text{ V}$ | $T_C = 25^\circ\text{C}$  | -    | 15   | -     | ns            |
| $t_b$                | Reverse Recovery Charge       |  |                           | -    | 11   | -     | ns            |
| $Q_{rr}$             |                               |  |                           | -    | 21   | -     | nC            |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse : Test Pulse width = 300  $\mu\text{s}$ , Duty Cycle = 2%.
2. Guaranteed by design.

TEST CIRCUIT AND WAVEFORMS

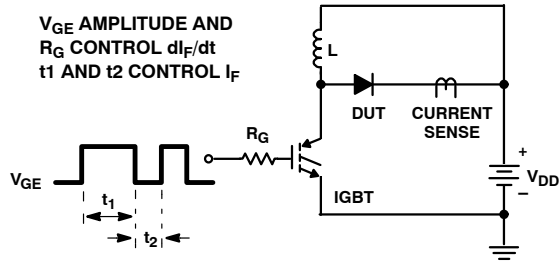


Figure 1.  $t_{rr}$  Test Circuit

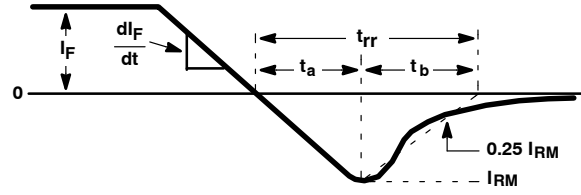


Figure 2.  $t_{rr}$  Waveforms and Definitions

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

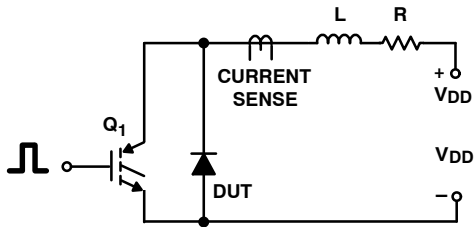


Figure 3. Avalanche Energy Test Circuit

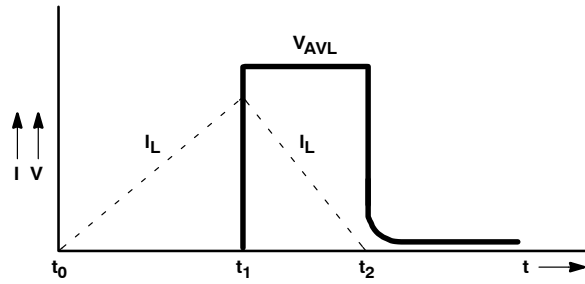


Figure 4. Avalanche Current and Voltage Waveforms

TYPICAL PERFORMANCE CHARACTERISTICS

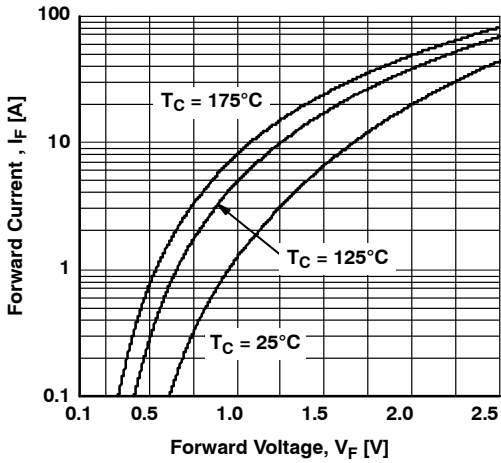


Figure 5. Typical Forward Voltage Drop vs. Forward Current

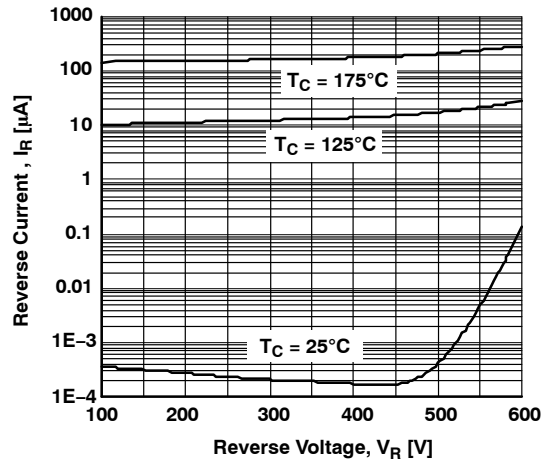


Figure 6. Typical Reverse Current vs. Reverse Voltage

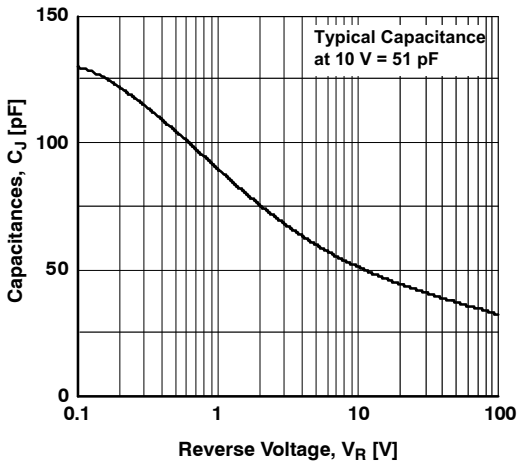


Figure 7. Typical Junction Capacitance

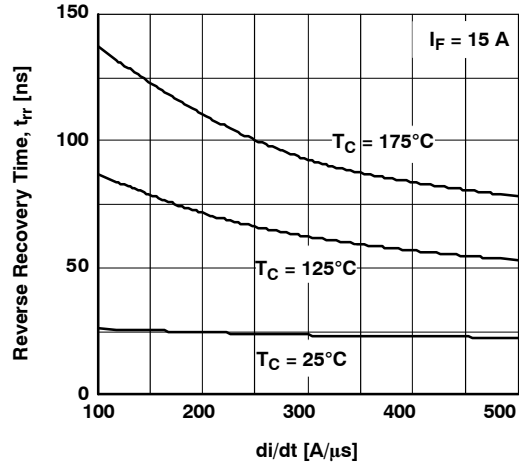


Figure 8. Typical Reverse Recovery Time vs. di/dt

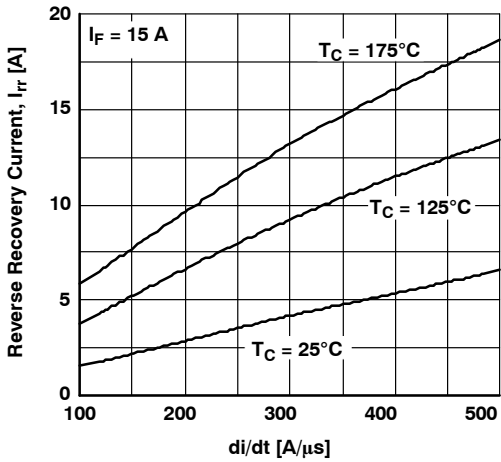


Figure 9. Typical Reverse Recovery Current vs. di/dt

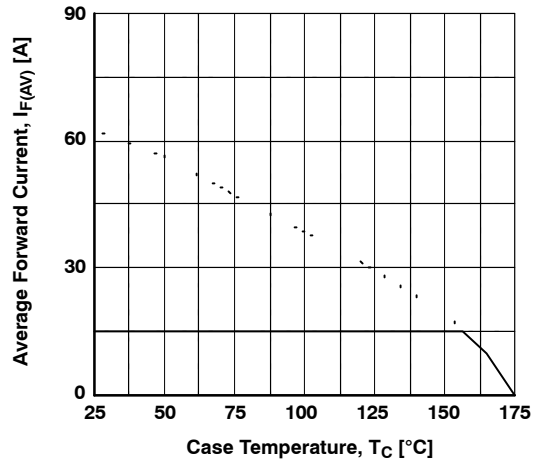


Figure 10. Forward Current Derating Curve

# RHRG1560CC-F085

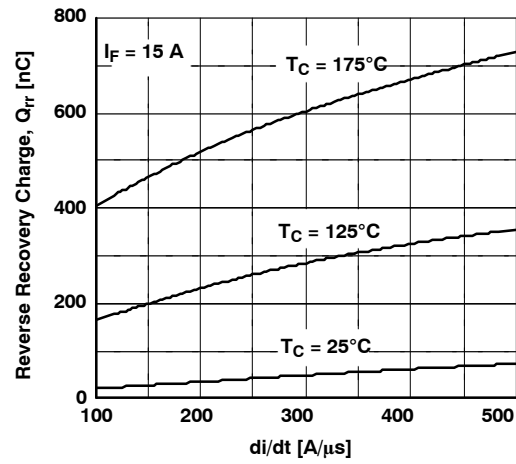


Figure 11. Reverse Recovery Charge

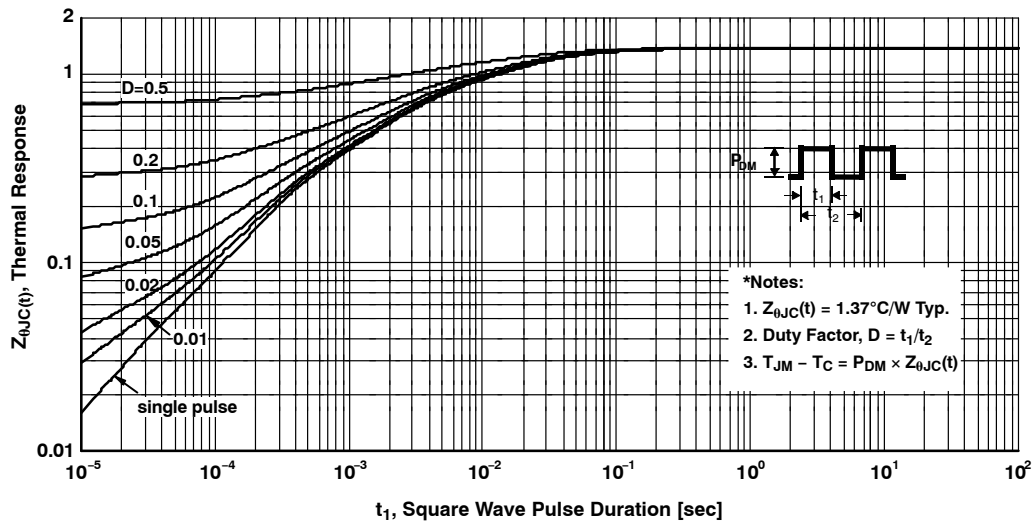
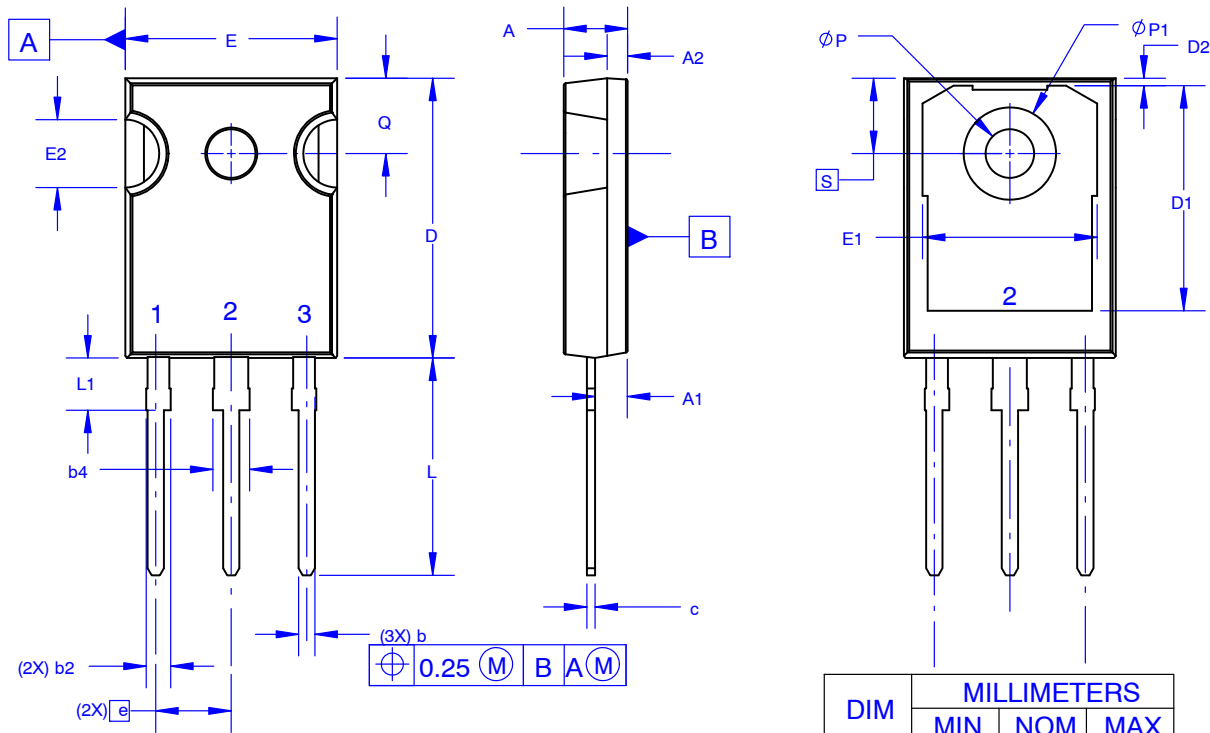


Figure 12. Transient Thermal Response Curve

**TO-247-3LD SHORT LEAD**  
**CASE 340CK**  
**ISSUE A**

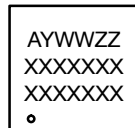
DATE 31 JAN 2019



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
- D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
- E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

**GENERIC MARKING DIAGRAM\***



- XXXX = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- ZZ = Assembly Lot Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

| DIM | MILLIMETERS |       |       |
|-----|-------------|-------|-------|
|     | MIN         | NOM   | MAX   |
| A   | 4.58        | 4.70  | 4.82  |
| A1  | 2.20        | 2.40  | 2.60  |
| A2  | 1.40        | 1.50  | 1.60  |
| b   | 1.17        | 1.26  | 1.35  |
| b2  | 1.53        | 1.65  | 1.77  |
| b4  | 2.42        | 2.54  | 2.66  |
| c   | 0.51        | 0.61  | 0.71  |
| D   | 20.32       | 20.57 | 20.82 |
| D1  | 13.08       | ~     | ~     |
| D2  | 0.51        | 0.93  | 1.35  |
| E   | 15.37       | 15.62 | 15.87 |
| E1  | 12.81       | ~     | ~     |
| E2  | 4.96        | 5.08  | 5.20  |
| e   | ~           | 5.56  | ~     |
| L   | 15.75       | 16.00 | 16.25 |
| L1  | 3.69        | 3.81  | 3.93  |
| ØP  | 3.51        | 3.58  | 3.65  |
| ØP1 | 6.60        | 6.80  | 7.00  |
| Q   | 5.34        | 5.46  | 5.58  |
| S   | 5.34        | 5.46  | 5.58  |

|                         |                       |  |
|-------------------------|-----------------------|--|
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| <b>DESCRIPTION:</b>     | TO-247-3LD SHORT LEAD | <b>PAGE 1 OF 1</b>   |

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