

Hyperfast Rectifier

50 A, 600 V

RHRG5060-F085

Description

The RHRG5060-F085 is an hyperfast diode with softrecovery characteristics ($t_{rr} < 45$ 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 ($t_{rr} = 45$ ns (Typ.) @ $I_F = 50$ A)
- Low Forward Voltage ($V_F = 1.67$ V (Typ.) @ $I_F = 50$ A)
- Avalanche Energy Rated
- AEC-Q101 Qualified
- This Device is Pb-Free

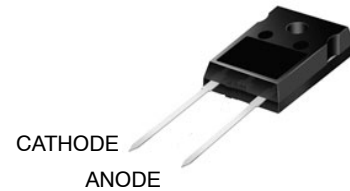
Applications

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

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

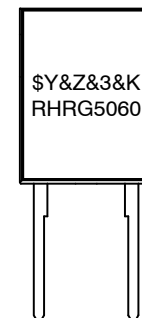
Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V_{RRM}	600	V
Working Peak Reverse Voltage	V_{RWM}	600	V
DC Blocking Voltage	V_R	600	V
Average Rectified Forward Current @ $T_C = 25^\circ\text{C}$	$I_{F(AV)}$	50	A
Non-repetitive Peak Surge Current (Halfwave 1 Phase 50 Hz)	I_{FSM}	150	A
Avalanche Energy (1.4 A, 40 mH)	E_{AVL}	40	mJ
Operating Junction and Storage Temperature	T_J, T_{STG}	-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.

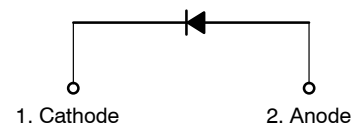


TO-247-2L
340CL

MARKING DIAGRAM



$\$Y$ = onsemi Logo
 $\&Z$ = Assembly Plant Code
 $\&3$ = Numeric Date Code
 $\&K$ = Lot Code
 RHRG5060 = Specific Device Code



ORDERING INFORMATION

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

RHRG5060–F085

THERMAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Maximum Thermal Resistance, Junction-to-Case	0.42	$^\circ\text{C/W}$
$R_{\theta JA}$	Maximum Thermal Resistance, Junction-to-Ambient	45	$^\circ\text{C/W}$

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Tube	Quantity
RHRG5060	RHRG5060–F085	TO–247	–	30

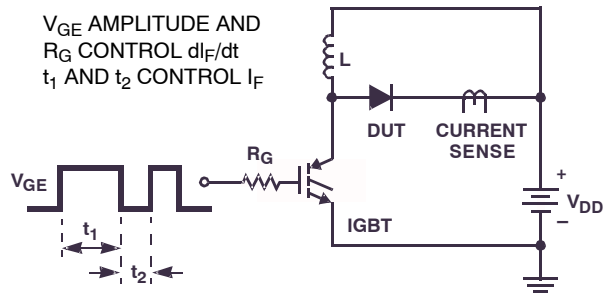
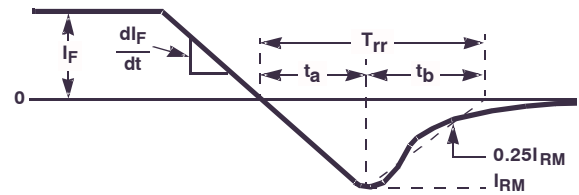
ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit	
I_R	Instantaneous Reverse Current	$V_R = 600\text{ V}$	$T_C = 25^\circ\text{C}$	–	–	250	μA	
			$T_C = 175^\circ\text{C}$	–	–	1.5	mA	
V_{FM} (Note 1)	Instantaneous Forward Voltage	$I_F = 50\text{ A}$	$T_C = 25^\circ\text{C}$	–	1.67	2.1	V	
			$T_C = 175^\circ\text{C}$	–	1.29	1.7	V	
t_{rr} (Note 2)	Reverse Recovery Time	$I_F = 1\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{CC} = 390\text{ V}$	$T_C = 25^\circ\text{C}$	–	37	45	ns	
			$T_C = 25^\circ\text{C}$	–	45	60	ns	
			$T_C = 175^\circ\text{C}$	–	200	–	ns	
t_a	Reverse Recovery Time	$I_F = 50\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{CC} = 390\text{ V}$	$T_C = 25^\circ\text{C}$	–	25	–	ns	
t_b	Reverse Recovery Charge			20	–	ns		
Q_{rr}				45	–	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 μs , Duty Cycle = 2%
2. Guaranteed by design

TEST CIRCUITS AND WAVEFORMS

Figure 1. T_{rr} Test CircuitFigure 2. T_{rr} Waveforms and Definitions

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

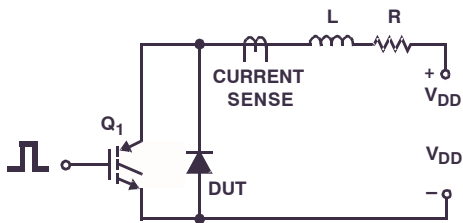


Figure 3. Avalanche Energy Test Circuit

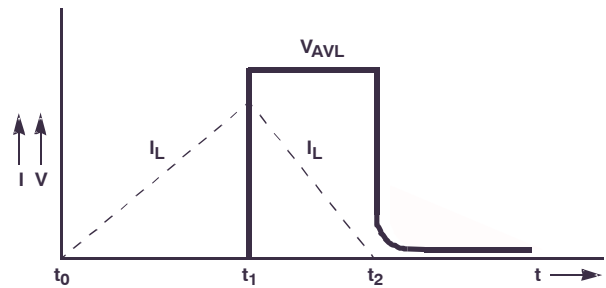


Figure 4. Avalanche Current and Voltage Waveforms

TYPICAL PERFORMANCE CHARECTERISTICS

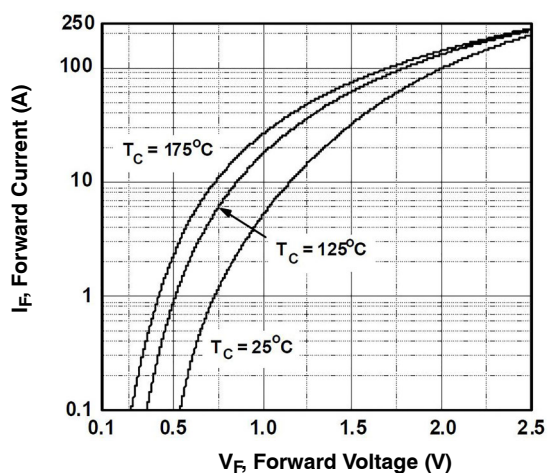


Figure 5. Typical Forward Voltage Drop vs. Forward Current

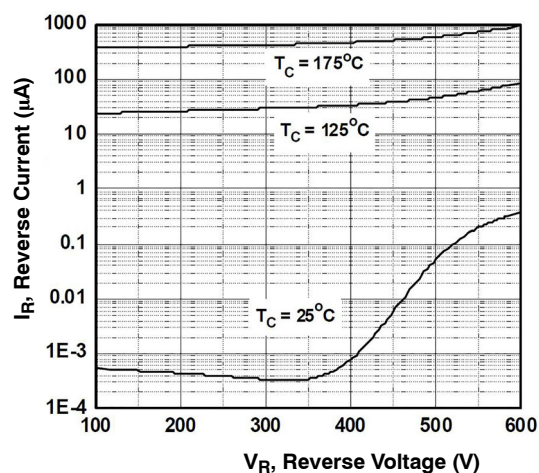


Figure 6. Typical Reverse Current vs. Reverse Voltage

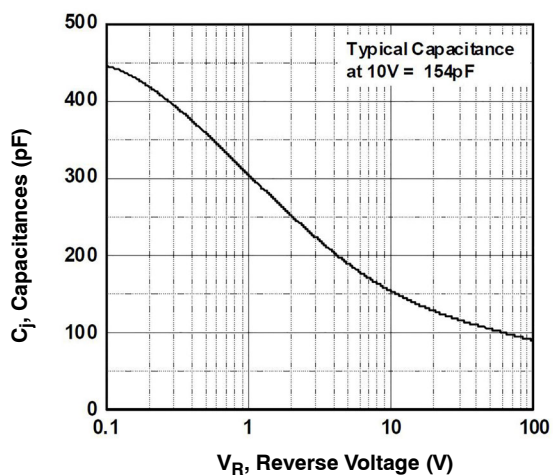


Figure 7. Typical Junction Capacitance

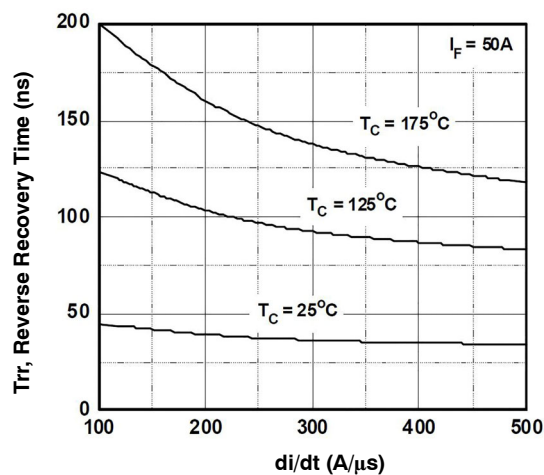


Figure 8. Typical Reverse Recovery Time vs. di/dt

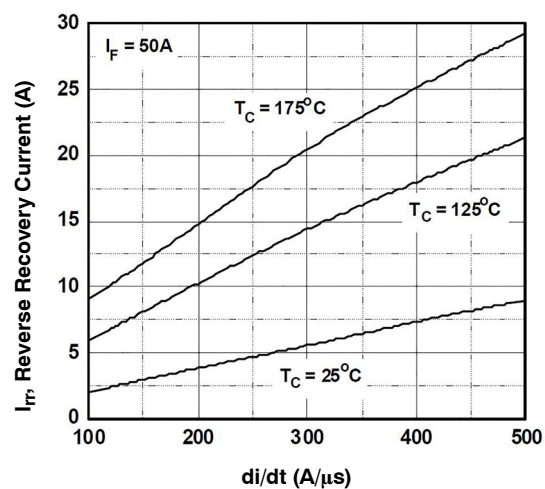


Figure 9. Typical Reverse Recovery Current vs. di/dt

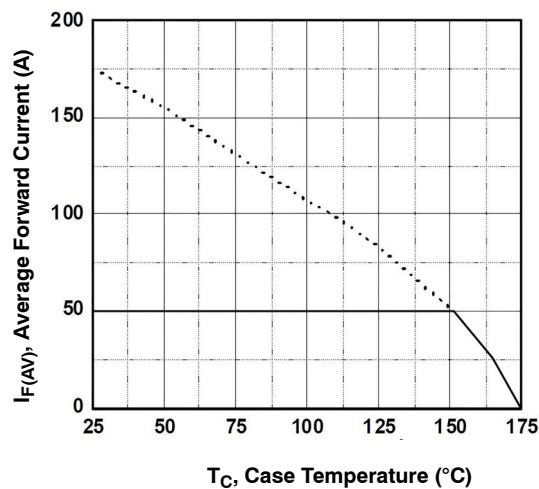


Figure 10. Forward Current Derating Curve

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

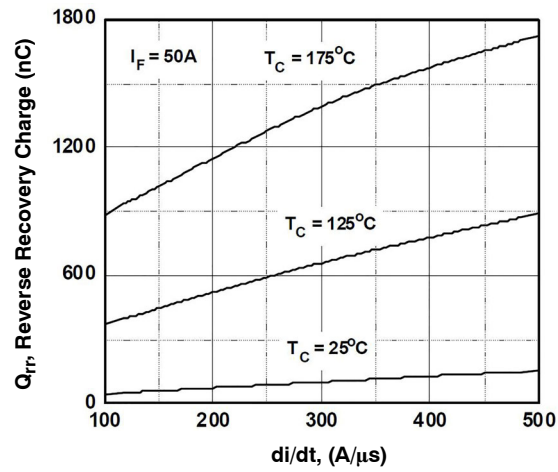


Figure 11. Reverse Recovery Charge

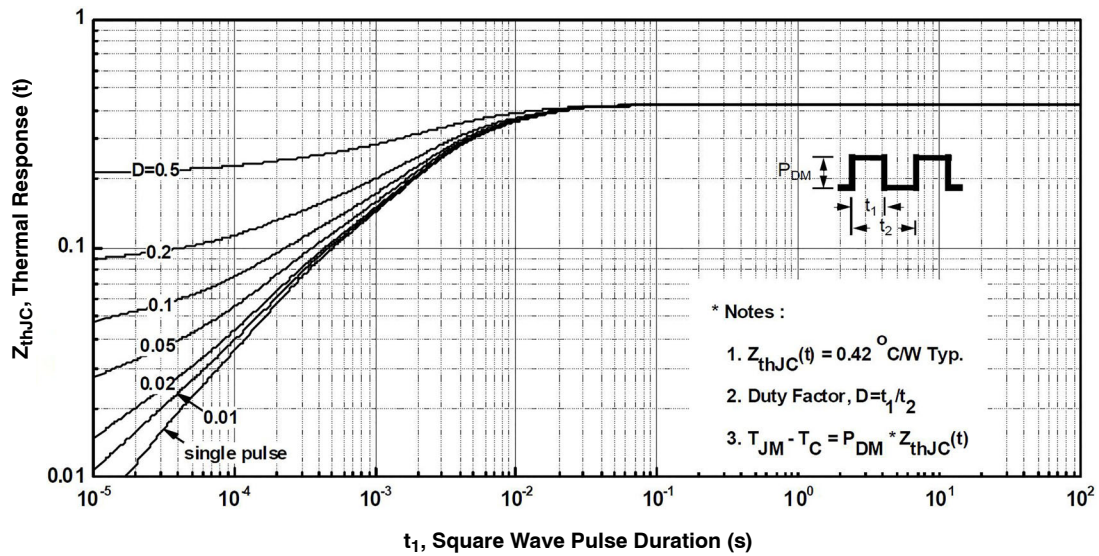
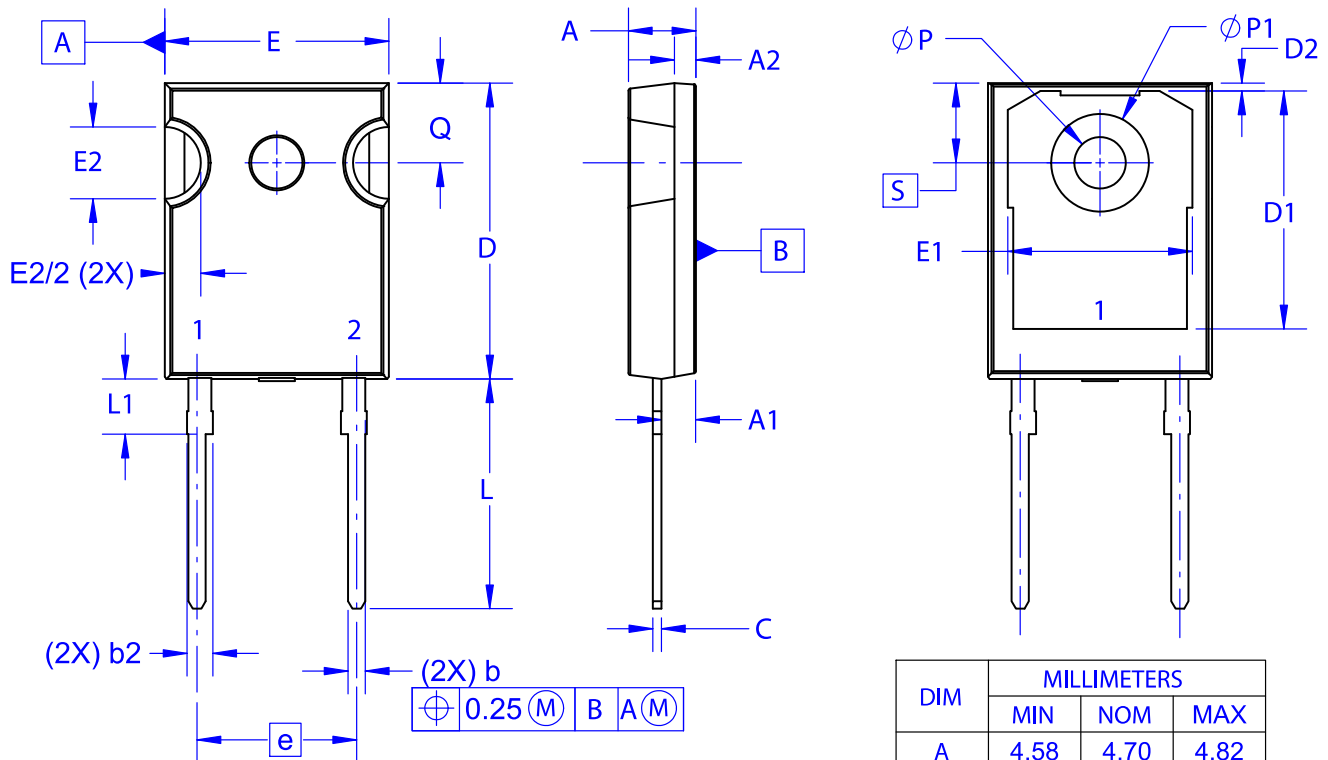


Figure 12. Transient Thermal Response Curve

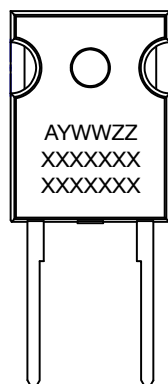
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- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
- D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
- E. LEAD FINISH IS UNCONTROLLED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

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