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July 2014

# RHRG5060\_F085 50A, 600V Hyperfast Rectifier

RHRG5060\_F085 50A, 600V Hyperfast Rectifier

## Features

- High Speed Switching (  $t_{rr}=45ns(Typ.) @ I_F=50A$  )
- Low Forward Voltage(  $V_F=1.67V(Typ.) @ I_F=50A$  )
- Avalanche Energy Rated
- AEC-Q101 Qualified

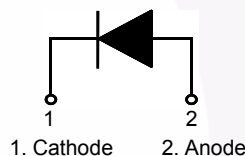
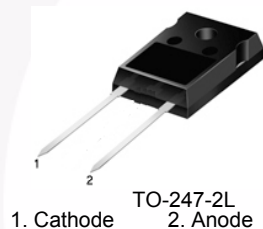
## Applications

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

## Max Ratings (600V, 50A)

The RHRG5060\_F085 is an Hyperfast™ diode with soft recovery characteristics ( $t_{rr} < 45ns$ ). 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.

## Pin Assignments



## Absolute Maximum Ratings T<sub>C</sub> = 25°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 @ $T_C = 25^\circ C$	50	A
$I_{FSM}$	Non-repetitive Peak Surge Current (Halfwave 1 Phase 50Hz)	150	A
$E_{AVL}$	Avalanche Energy (1.4A, 40mH)	40	mJ
$T_J, T_{STG}$	Operating Junction and Storage Temperature	- 55 to +175	°C

## Thermal Characteristics T<sub>C</sub> = 25°C unless otherwise noted

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

## Package Marking and Ordering Information

Device Marking	Device	Package	Tube	Quantity
RHRG5060	RHRG5060_F085	TO-247	-	30

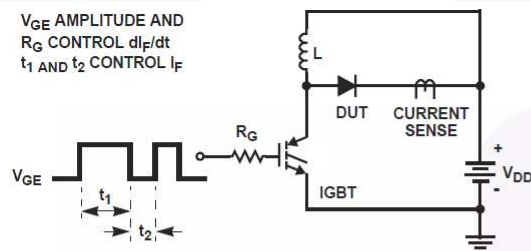
## Electrical Characteristics T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units	
I <sub>R</sub>	Instantaneous Reverse Current	V <sub>R</sub> = 600V	T <sub>C</sub> = 25 °C	-	-	250	uA
			T <sub>C</sub> = 175 °C	-	-	1.5	mA
V <sub>FM</sub> <sup>1</sup>	Instantaneous Forward Voltage	I <sub>F</sub> = 50A	T <sub>C</sub> = 25 °C	-	1.67	2.1	V
			T <sub>C</sub> = 175 °C	-	1.29	1.7	V
t <sub>rr</sub> <sup>2</sup>	Reverse Recovery Time	I <sub>F</sub> = 1A, di/dt = 100A/μs, V <sub>CC</sub> = 390V	T <sub>C</sub> = 25 °C	-	37	45	ns
		I <sub>F</sub> = 50A, di/dt = 100A/μs, V <sub>CC</sub> = 390V	T <sub>C</sub> = 25 °C	-	45	60	ns
			T <sub>C</sub> = 175 °C	-	200	-	ns
t <sub>a</sub>	Reverse Recovery Time	I <sub>F</sub> = 50A, di/dt = 100A/μs, V <sub>CC</sub> = 390V	T <sub>C</sub> = 25 °C	-	25	-	ns
t <sub>b</sub>	Reverse Recovery Time			-	20	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge			-	45	-	nC

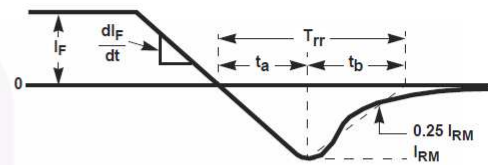
### Notes:

1. Pulse : Test Pulse width = 300μs, Duty Cycle = 2%
2. Guaranteed by design

### Test Circuit and Waveforms

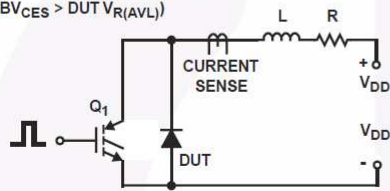


T<sub>rr</sub> TEST CIRCUIT

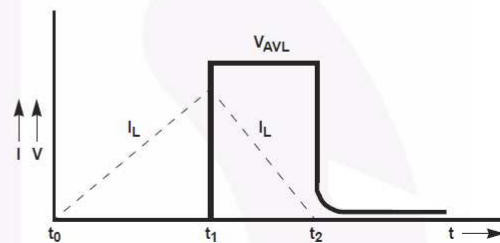


T<sub>rr</sub> WAVEFORMS AND DEFINITIONS

I<sub>MAX</sub> = 1.4A  
L = 40mH  
R < 0.1Ω  
E<sub>AVL</sub> = 1/2LI<sup>2</sup> [V<sub>R(AVL)</sub>/(V<sub>R(AVL)</sub> - V<sub>DD</sub>)]  
Q<sub>1</sub> = IGBT (BV<sub>CES</sub> > DUT V<sub>R(AVL)</sub>)



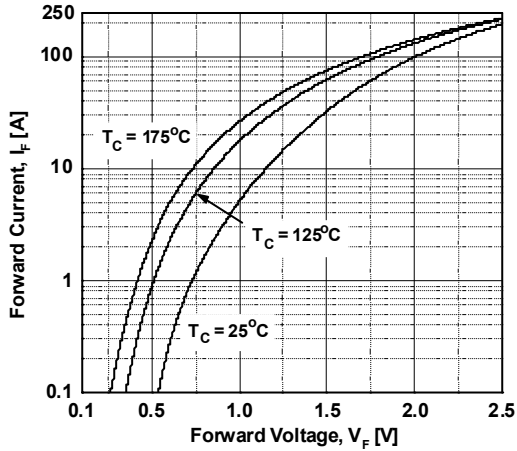
AVALANCHE ENERGY TEST CIRCUIT



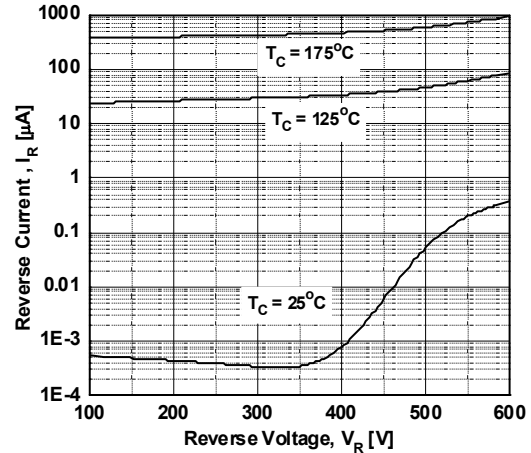
AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

## Typical Performance Characteristics

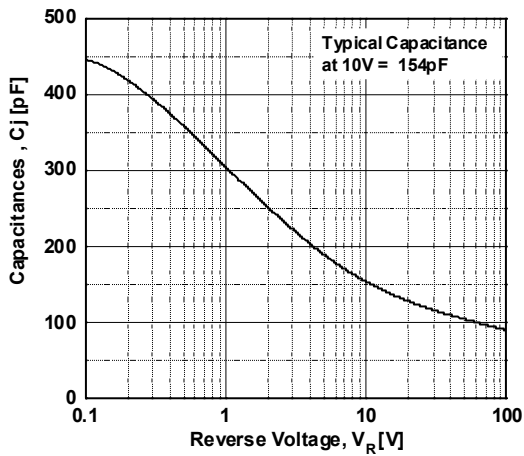
**Figure 1. Typical Forward Voltage Drop vs. Forward Current**



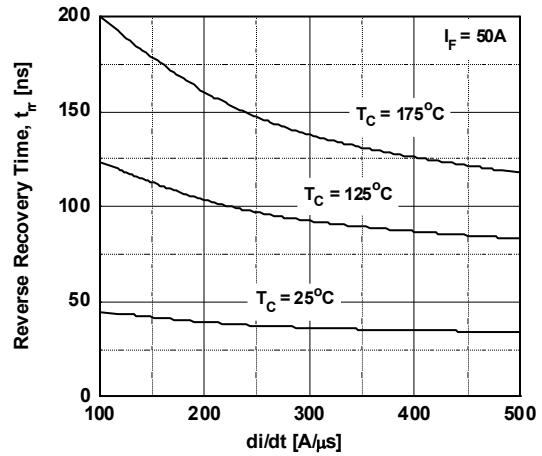
**Figure 2. Typical Reverse Current vs. Reverse Voltage**



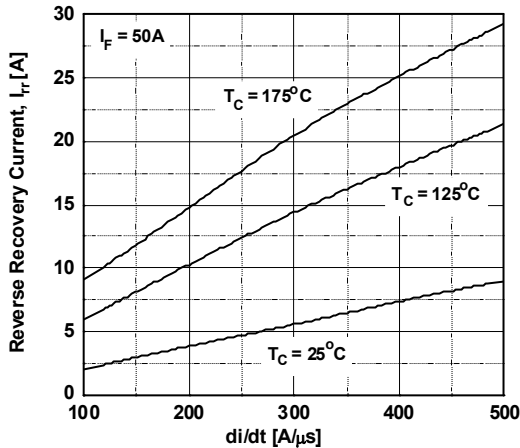
**Figure 3. Typical Junction Capacitance**



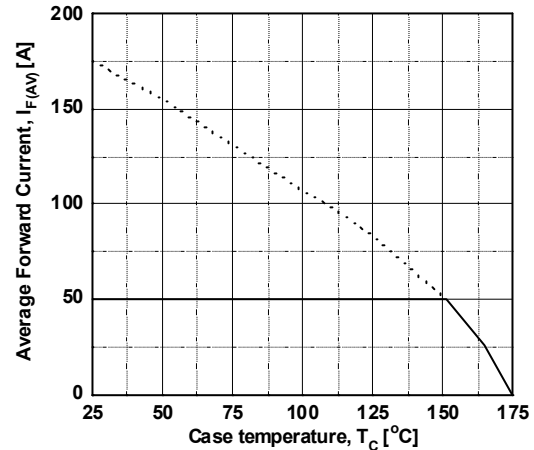
**Figure 4. Typical Reverse Recovery Time vs. di/dt**



**Figure 5. Typical Reverse Recovery Current vs. di/dt**



**Figure 6. Forward Current Derating Curve**



Typical Performance Characteristics (Continued)

Figure 7. Reverse Recovery Charge

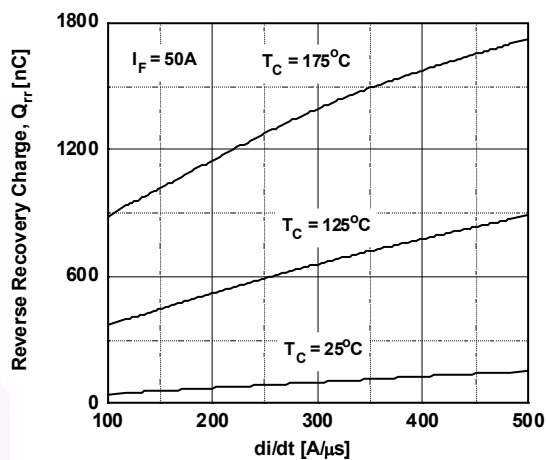
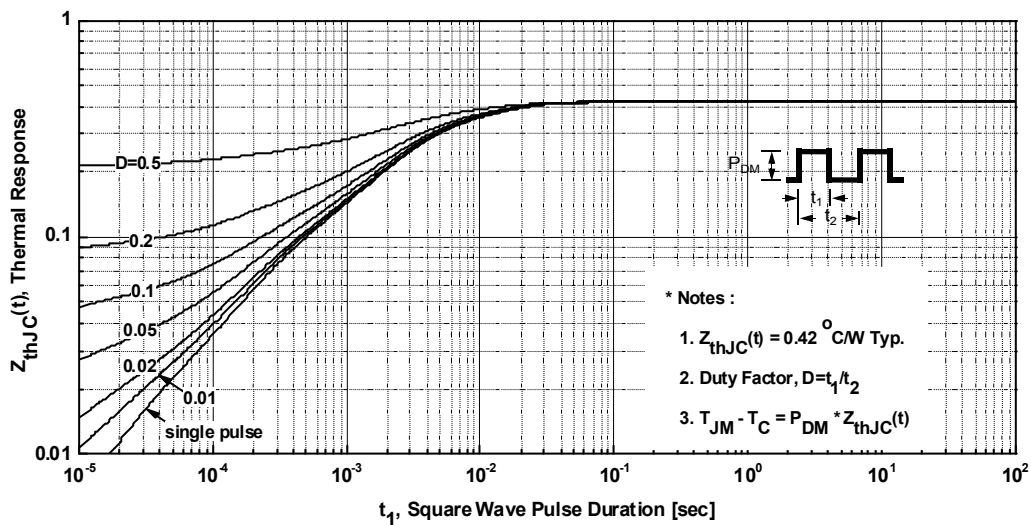
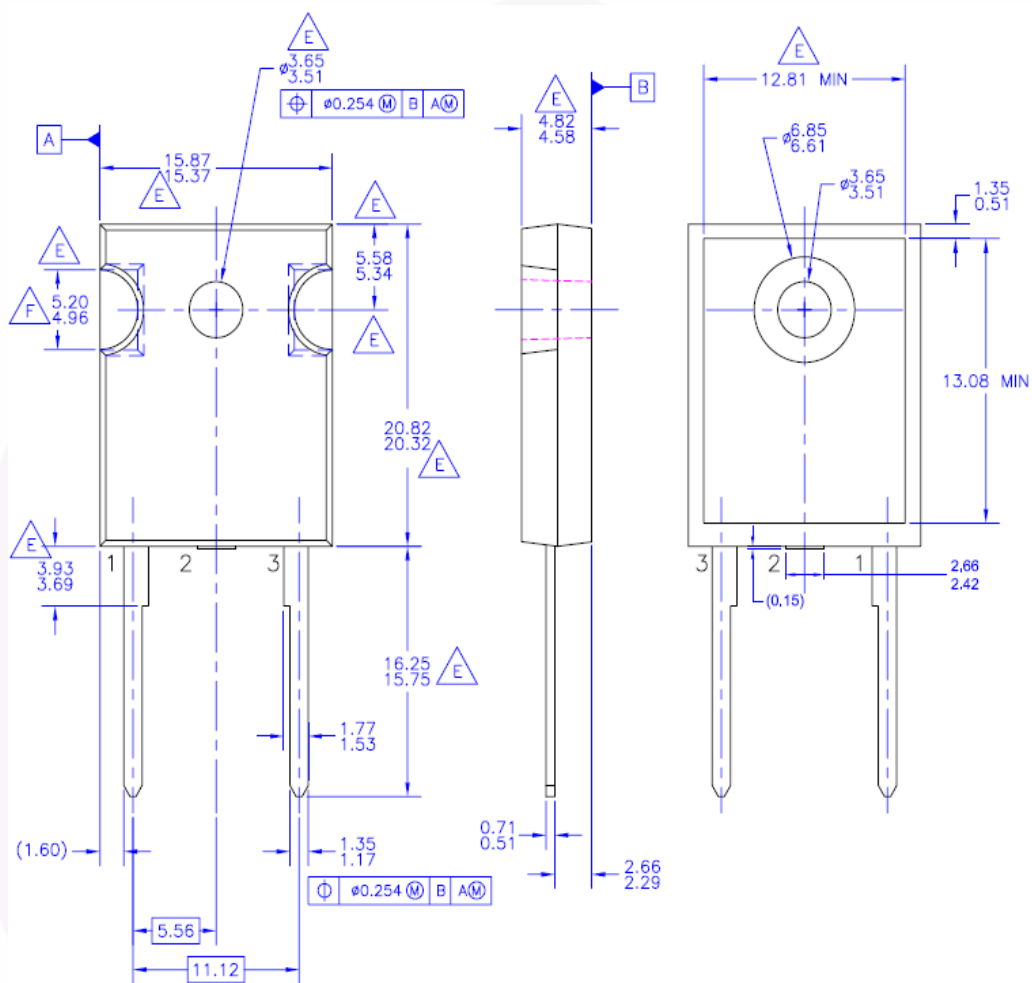


Figure 8. Transient Thermal Response Curve



Mechanical Dimensions

TO-247-2L








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  - NOTCH MAY BE SQUARE
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Dimensions in Millimeters



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