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July 2014

RHRG5060_F085

50A, 600V Hyperfast Rectifier

Features

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

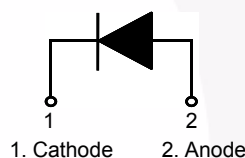
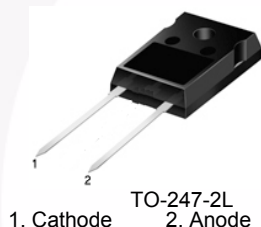
Applications

- 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 ($t_{rr} < 45\text{ns}$). 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.

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 @ $T_C = 25^\circ\text{C}$	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	$^\circ\text{C}$

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

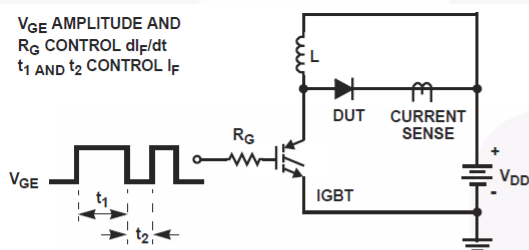
Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units
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}^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}^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
		$I_F = 50\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{CC} = 390\text{V}$	$T_C = 25^\circ\text{C}$ $T_C = 175^\circ\text{C}$	- -	45 200	60 - 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 Time	$I_F = 50\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{CC} = 390\text{V}$	$T_C = 25^\circ\text{C}$	-	20	- ns
Q_{rr}	Reverse Recovery Charge	$I_F = 50\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{CC} = 390\text{V}$	$T_C = 25^\circ\text{C}$	-	45	- nC

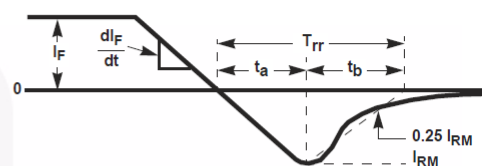
Notes:

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

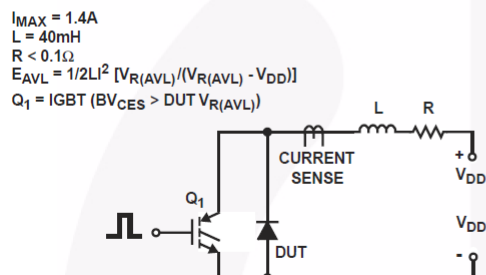
Test Circuit and Waveforms



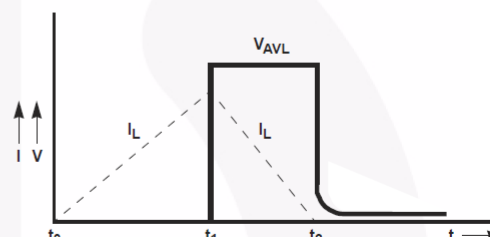
T_{rr} TEST CIRCUIT



T_{rr} WAVEFORMS AND DEFINITIONS



AVALANCHE ENERGY TEST CIRCUIT



AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Typical Performance Characteristics

Figure 1. Typical Forward Voltage Drop vs. Forward Current

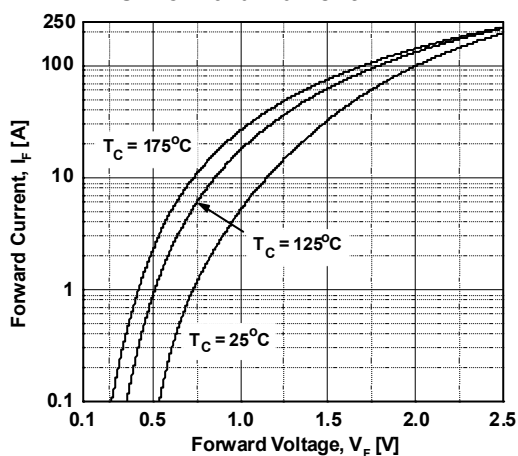


Figure 2. Typical Reverse Current vs. Reverse Voltage

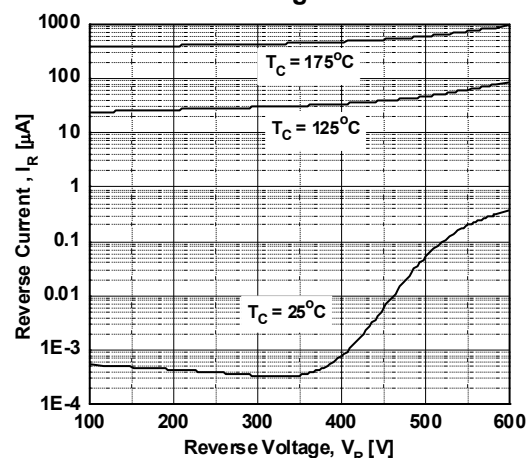


Figure 3. Typical Junction Capacitance

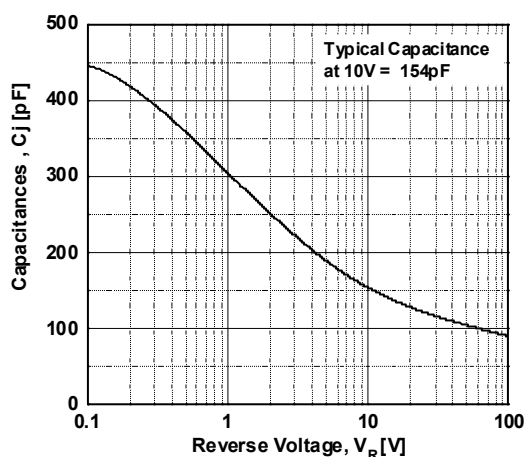


Figure 4. Typical Reverse Recovery Time vs. di/dt

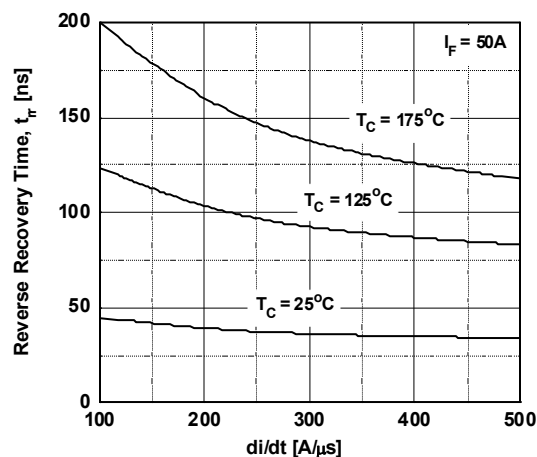


Figure 5. Typical Reverse Recovery Current vs. di/dt

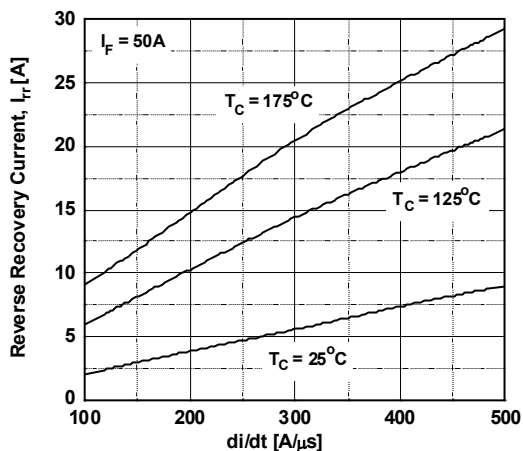
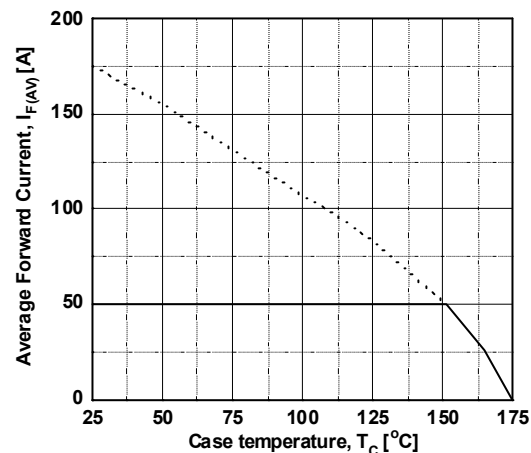


Figure 6. Forward Current Derating Curve



Typical Performance Characteristics (Continued)

Figure 7. Reverse Recovery Charge

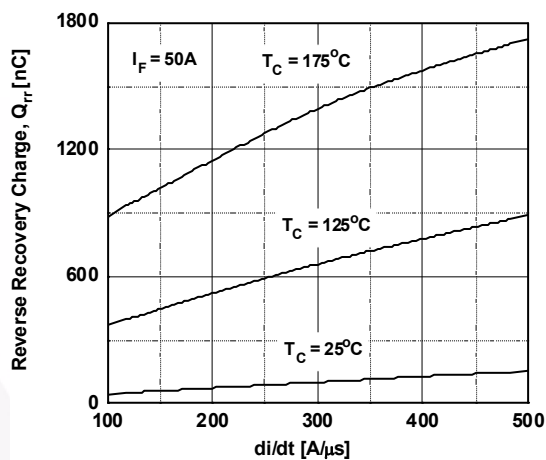
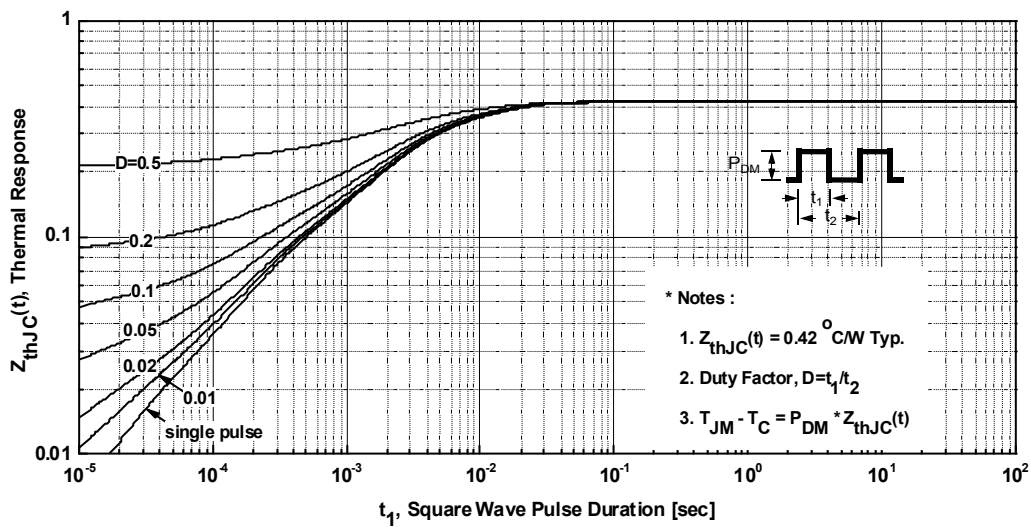
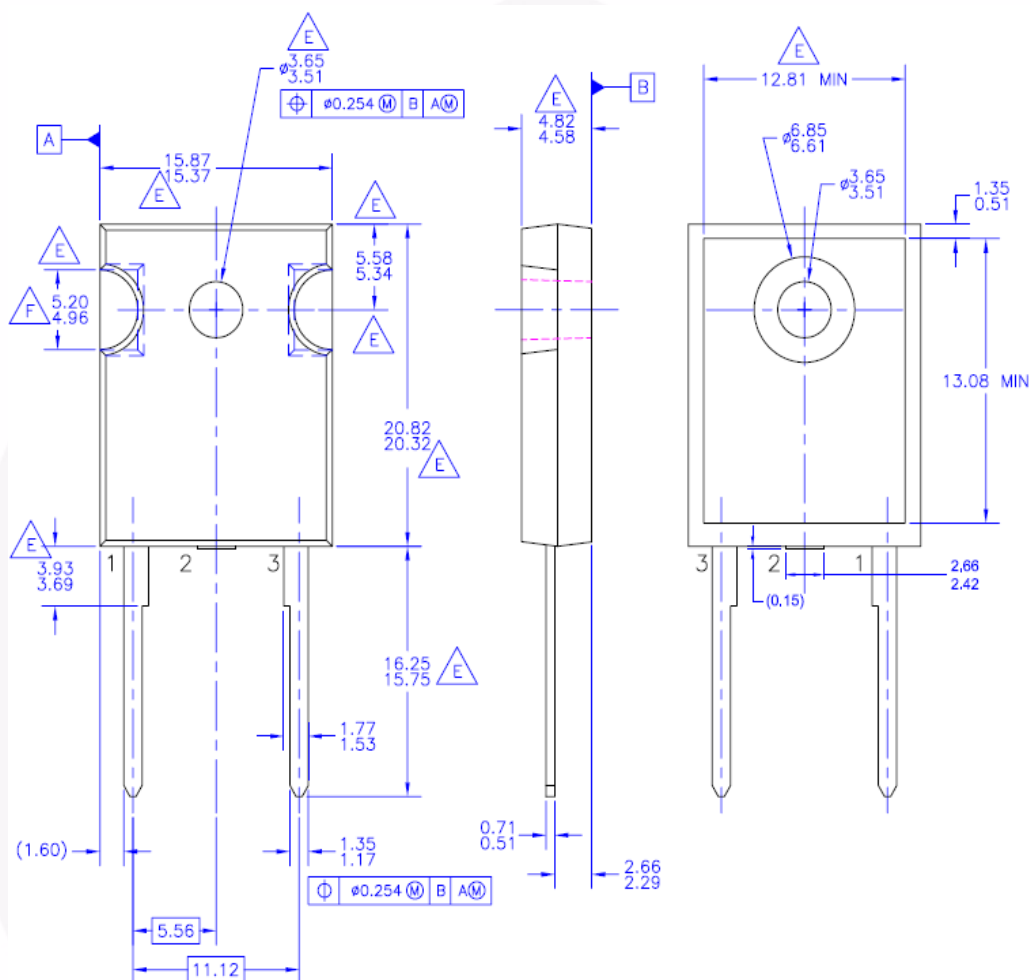


Figure 8. Transient Thermal Response Curve



Mechanical Dimensions

TO-247-2L



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- 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

Dimensions in Millimeters



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