Hyperfast Diode

30 A, 400 V - 600 V

RHRG3040, RHRG3060

Description

The RHRG3040, RHRG3060 is a hyperfast 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.

Features

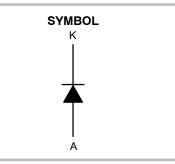
- Hyperfast Recovery $t_{rr} = 45 \text{ ns} (@ I_F = 30 \text{ A})$
- Max Forward Voltage, $V_F = 2.1 \text{ V} (@ T_C = 25^{\circ}\text{C})$
- 400 V, 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- These Devices are Pb-Free and are RoHS Compliant

Applications

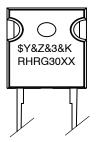
- Switching Power Supplies
- Power Switching Circuits
- General Purpose







MARKING DIAGRAM



\$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
RHRG30XX	= Specific Device Code
XX	= 40, 60

ORDERING INFORMATION

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

RHRG3040, RHRG3060

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

Parameter	Symbol	RHRG3040	RHRG3060	Unit
Peak Repetitive Reverse Voltage	V _{RRM}	400	600	V
Working Peak Reverse Voltage	V _{RWM}	400	600	V
DC Blocking Voltage	V _R	400	600	V
Average Rectified Forward Current ($T_C = 120^{\circ}C$)	I _{F(AV)}	30	30	А
Repetitive Peak Surge Current (Square Wave, 20 kHz)	I _{FRM}	70	70	А
Non-repetitive Peak Surge Current (Halfwave, 1 Phase, 60 Hz)	I _{FSM}	325	325	А
Maximum Power Dissipation	PD	125	125	W
Avalanche Energy (See Figures 10 and 11)	E _{AVL}	20	20	mJ
Operating and Storage Temperature	T _{STG} , T _J	-65 to 175	-65 to 175	°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.

PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Shipping
RHRG3040	RHRG3040	TO-247-2LD	450 / Tube
RHRG3060	RHRG3060	TO-247-2LD	450 / Tube

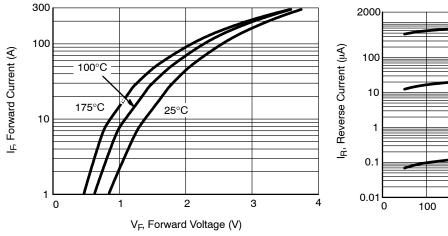
ELECTRICAL SPECIFICATION ($T_C = 25^{\circ}C$, unless otherwise specified)

		RHRG3040			RHRG3060				
Characteristics	Symbol	Test Condition	Min	Тур	Max	Min	Тур	Max	Unit
Instantaneous Forward Voltage	V _F	I _F = 30 A	-	-	2.1	-	-	2.1	V
(Pulse Width = 300 μs, Duty Cycle = 2%)		I _F = 30 A, T _C = 150°C	-	-	1.7	-	-	1.7	V
Instantaneous Reverse Current	I _R	V _R = 400 V	-	-	250	-	-	_	μA
		V _R = 600 V	-	-	-	-	-	250	μA
		V_{R} = 400 V, T_{C} = 150°C	-	-	1.0	-	-	-	mA
		$V_{\rm R}$ = 600 V, $T_{\rm C}$ = 150°C	-	-	-	-	-	1.0	mA
Reverse Recovery Time (See Figure 9)	t _{rr}	$I_F = 1 \text{ A}, \text{ d}I_F/\text{d}t = 200 \text{ A}/\mu\text{s}$	-	-	40	-	-	40	ns
Summation of $t_a + t_b$		I_F = 30 A, dI _F /dt = 200 A/µs	-	-	45	-	-	45	ns
Time to Reach Peak Reverse Current (See Figure 9)	t _a	I_F = 30 A, dI _F /dt = 200 A/µs	-	22	-	-	22	-	ns
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)	t _b	I _F = 30 A, dI _F /dt = 200 A/μs	_	18	_	_	18	_	ns
Reverse Recovery Charge	Q _{rr}	I _F = 30 A, dI _F /dt = 200 A/μs	-	100		-	100	-	nC
Junction Capacitance	CJ	V _R = 10 V, I _F = 0 A	-	85		-	85	-	pF
Thermal Resistance Junction to Case	$R_{\theta JC}$		-	_	1.2	_	-	1.2	°C/W

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.

RHRG3040, RHRG3060

TYPICAL PERFORMANCE CURVES





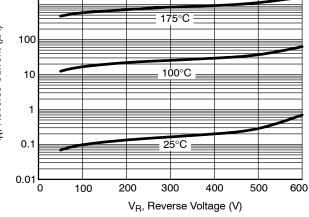


Figure 2. Reverse Current vs. Reverse Voltage

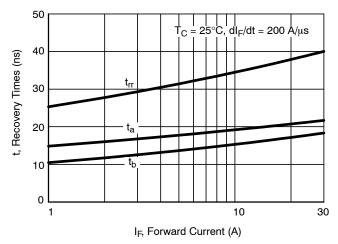


Figure 3. $t_{rr},\,t_a$ and t_b Curves vs. Forward Current

175°C.

 T_{C} =

tb

150

125

100

75

50

25

0

1

t, Recovery Times (ns)

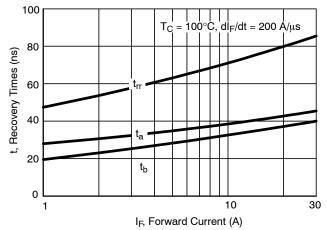


Figure 4. t_{rr}, t_a and t_b Curves vs. Forward Current

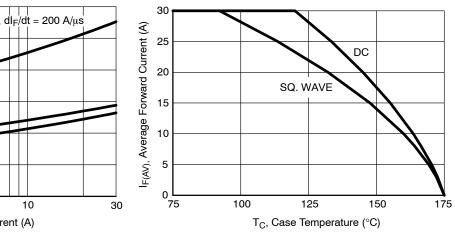


Figure 5. t_{rr}, t_a and t_b Curves vs. Forward Current

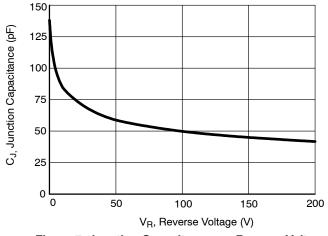
I_F, Forward Current (A)

10



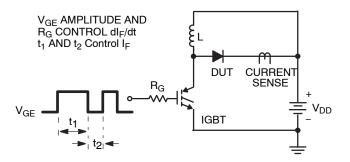
RHRG3040, RHRG3060

TYPICAL PERFORMANCE CURVES (continued)





TEST CIRCUITS AND WAVEFORMS





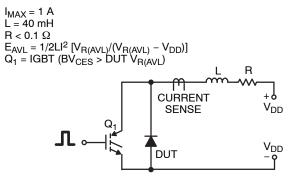


Figure 10. Avalanche Energy Test Circuit

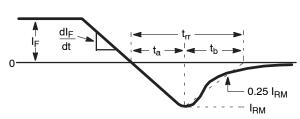


Figure 9. t_{rr} Waveforms and Definitions

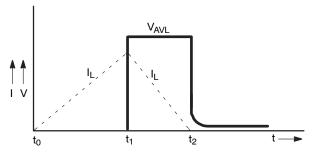
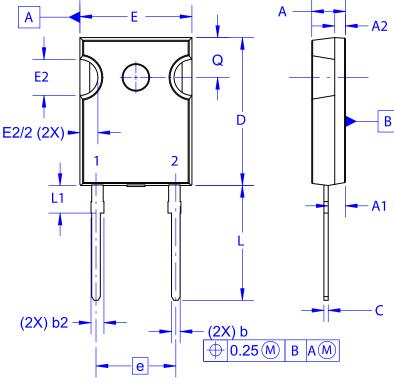


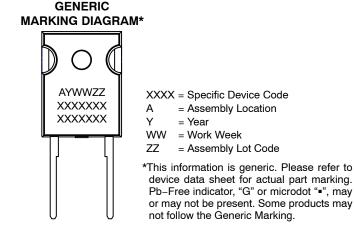
Figure 11. Avalanche Current and Voltage Waveforms

TO-247-2LD CASE 340CL **ISSUE A**



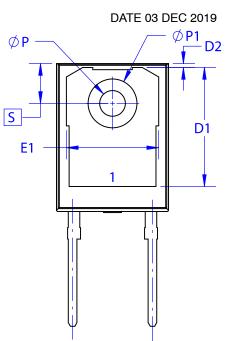
NOTES: UNLESS OTHERWISE SPECIFIED.

- 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.



DOCUMENT NUMBER:	98AON13850G Electronic versions are uncontrolled except when accessed directly from the Document Repos Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.		
DESCRIPTION:	TO-247-2LD		PAGE 1 OF 1

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.



			1		
DIM	MILLIMETERS				
DIN	MIN	NOM	MAX		
Α	4.58	4.70	4.82		
A1	2.29	2.40	2.66		
A2	1.30	1.50	1.70		
b	1.17	1.26	1.35		
b2	1.53	1.65	1.77		
С	0.51	0.61	0.71		
D	20.32	20.57	20.82		
D1	16.37	16.57	16.77		
D2	0.51	0.93	1.35		
Е	15.37	15.62	15.87		
E1	12.81	~	~		
E2	4.96	5.08	5.20		
е	~	11.12	~		
L	15.75	16.00	16.25		
L1	3.69	3.81	3.93		
ØР	3.51	3.58	3.65		
Ø P 1	6.61	6.73	6.85		
Q	5.34	5.46	5.58		
S	5.34	5.46	5.58		

onsemi, ONSEMI, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries. onsemi owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of onsemi's product/patent coverage may be accessed at <u>www.onsemi.com/site/pdf/Patent_Marking.pdf</u>. onsemi reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and onsemi makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or indental damages. Buyer is responsible for its products and applications using onsemi products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by onsemi. "Typical" parameters which may be provided in onsemi data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. onsemi does not convey any license under any of its intellectual property rights nor the rights of others. onsemi products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification. Buyer shall indemnify and hold onsemi and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs,

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation onsemi Website: www.onsemi.com

ONLINE SUPPORT: <u>www.onsemi.com/support</u> For additional information, please contact your local Sales Representative at <u>www.onsemi.com/support/sales</u>