

# Ultrafast Rectifier

## 80 A, 600 V

### RURG8060-F085

#### Description

The RURG8060-F085 is an ultrafast diode with soft recovery characteristics ( $t_{rr} < 90\text{ns}$ ). It has low forward voltage drop and is of silicon nitride passivated ionimplanted epitaxial planar construction.

This device is intended for use as a freewheeling/ clamping diode and rectifier in a variety of switching power supplies and other power switching applications. Its low stored charge and ultrafast recovery with soft recovery characteristic minimize ringing and electrical noise in many power switching circuits, thus reducing power loss in the switching transistors.

#### Features

- High Speed Switching ( $t_{rr} = 74\text{ ns (Typ.) @ } I_F = 80\text{ A}$ )
- Low Forward Voltage ( $V_F = 1.34\text{ V (Typ.) @ } I_F = 80\text{ A}$ )
- Avalanche Energy Rated
- AEC-Q101 Qualified
- This Device is Pb-Free

#### Applications

- Automotive DCDC converter
- Automotive On Board Charger
- Switching Power Supply
- Power Switching Circuits

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

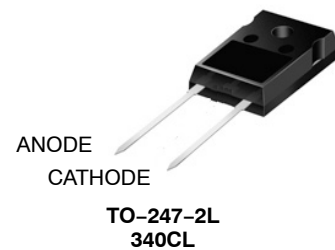
Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	$V_{RRM}$	600	V
Working Peak Reverse Voltage	$V_{RWM}$	600	V
DC Blocking Voltage	$V_R$	600	V
Average Rectified Forward Current ( $T_C = 25^\circ\text{C}$ )	$I_{F(AV)}$	80	A
Non-repetitive Peak Surge Current (Halfwave 1 Phase 50 Hz)	$I_{FSM}$	240	A
Avalanche Energy (1.6 A, 40 mH)	$E_{AVL}$	50	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.

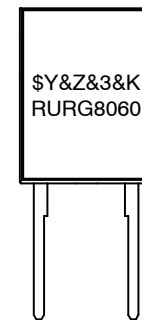


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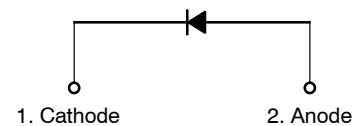
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#### MARKING DIAGRAM



\$Y = ON Semiconductor Logo  
&Z = Assembly Plant Code  
&3 = Numeric Date Code  
&K = Lot Code  
RURG8060 = Specific Device Code



#### ORDERING INFORMATION

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

## RURG8060–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	0.85	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient	50	$^\circ\text{C}/\text{W}$

### PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Tube	Quantity
RURG8060	RURG8060–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	$\mu\text{A}$
			$T_C = 175^\circ\text{C}$	–	–	2	$\text{mA}$
$V_{FM}$ (Note 1)	Instantaneous Forward Voltage	$I_F = 80\text{ A}$	$T_C = 25^\circ\text{C}$	–	1.34	1.6	$\text{V}$
			$T_C = 175^\circ\text{C}$	–	1.17	1.4	$\text{V}$
$t_{rr}$ (Note 2)	Reverse Recovery Time	$I_F = 1\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{CC} = 390\text{ V}$	$T_C = 25^\circ\text{C}$	–	46	75	$\text{ns}$
			$T_C = 25^\circ\text{C}$	–	74	90	$\text{ns}$
			$T_C = 175^\circ\text{C}$	–	290	–	$\text{ns}$
$t_a$ $t_b$ $Q_{rr}$	Reverse Recovery Time Reverse Recovery Charge	$I_F = 80\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{CC} = 390\text{ V}$	$T_C = 25^\circ\text{C}$	–	38 36 130	– – –	$\text{ns}$ $\text{ns}$ $\text{nC}$
$E_{AVL}$	Avalanche Energy	$I_{AV} = 1.6\text{ A}$ , $L = 40\text{ mH}$	50	–	–	$\text{mJ}$	

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

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.

TEST CIRCUITS AND WAVEFORMS

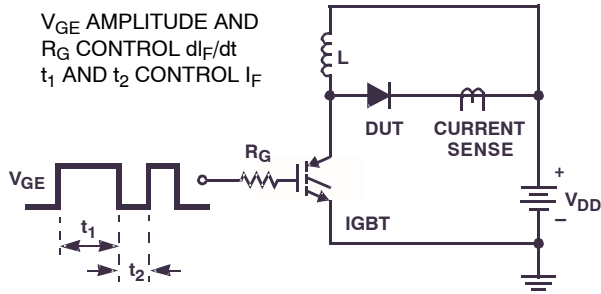


Figure 1.  $T_{rr}$  Test Circuit

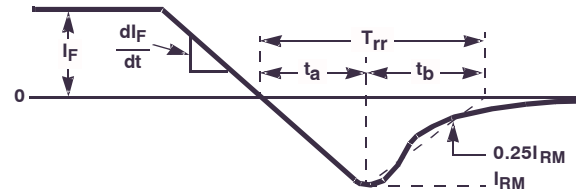


Figure 2.  $T_{rr}$  Waveforms and Definitions

$I = 1.6 \text{ A}$   
 $L = 40 \text{ mH}$   
 $R < 0.1 \Omega$   
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q_1 = \text{IGBT (} BV_{CES} > \text{DUT } V_{R(AVL)} \text{)}$

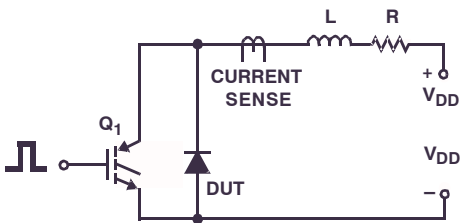


Figure 3. Avalanche Energy Test Circuit

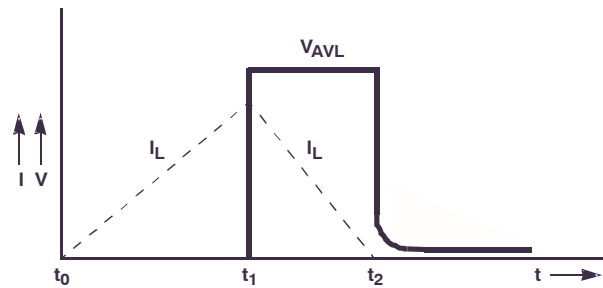


Figure 4. Avalanche Current and Voltage Waveforms

TYPICAL PERFORMANCE CHARECTERISTICS

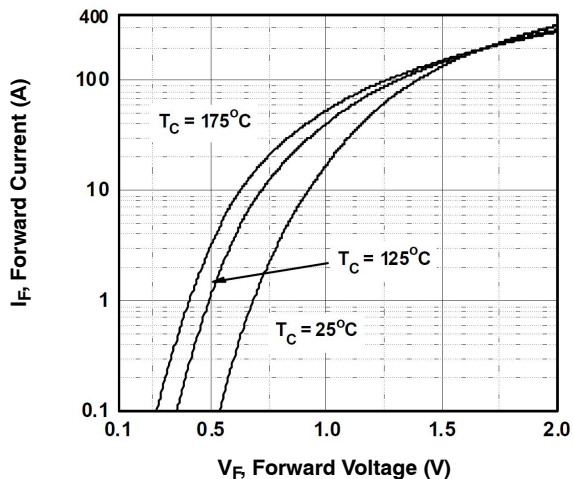


Figure 5. Typical Forward Voltage Drop vs. Forward Current

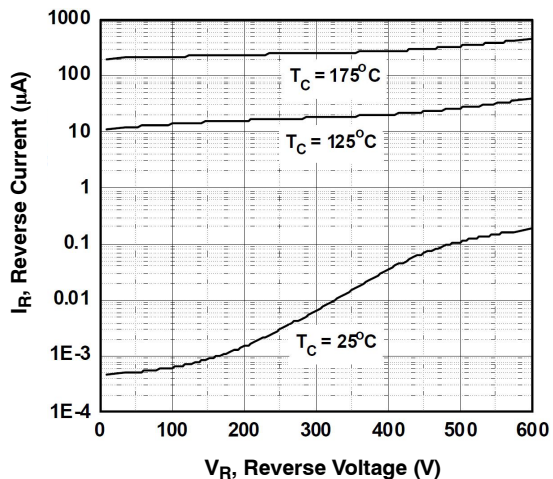


Figure 6. Typical Reverse Current vs. Reverse Voltage

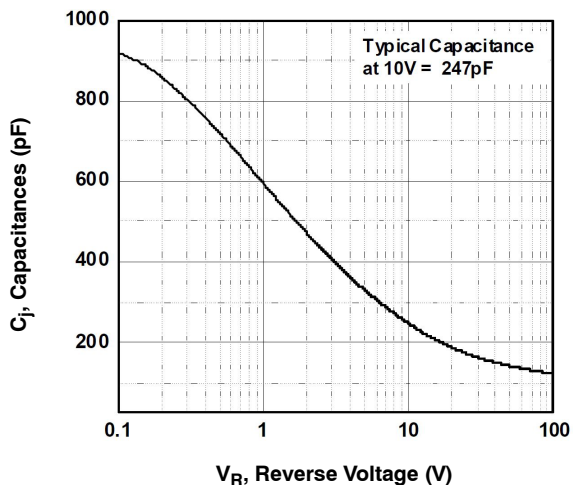


Figure 7. Typical Junction Capacitance

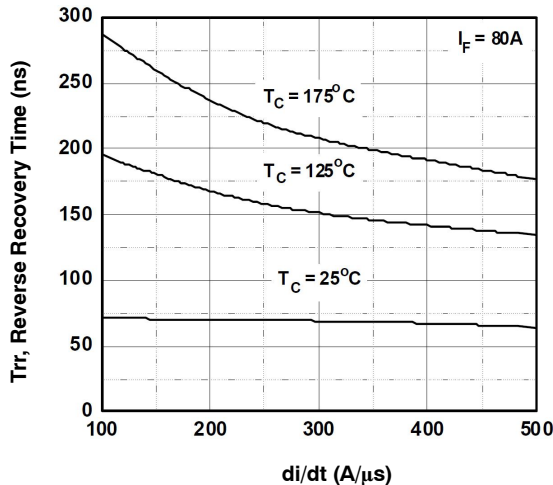


Figure 8. Typical Reverse Recovery Time vs. di/dt

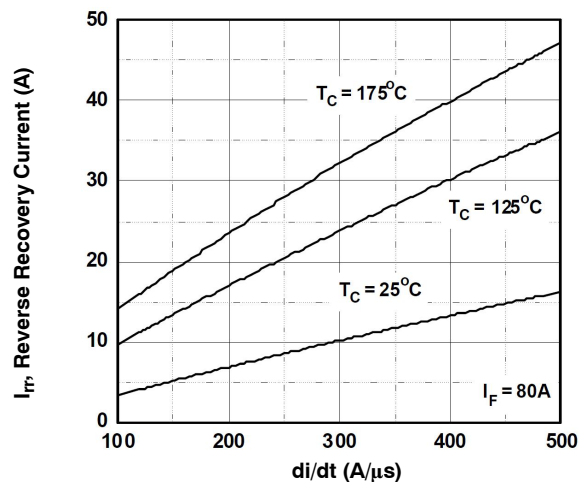


Figure 9. Typical Reverse Recovery Current vs. di/dt

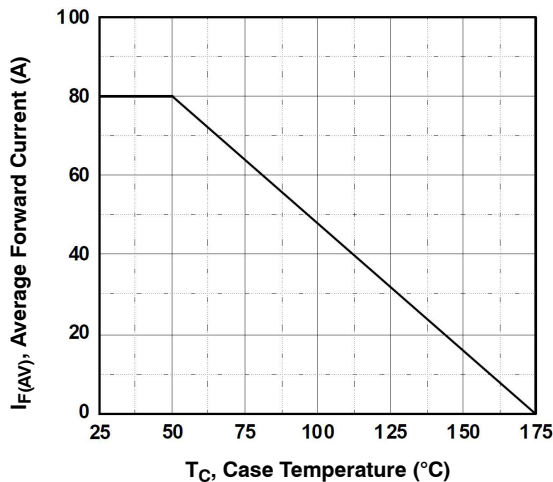


Figure 10. Forward Current Derating Curve

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

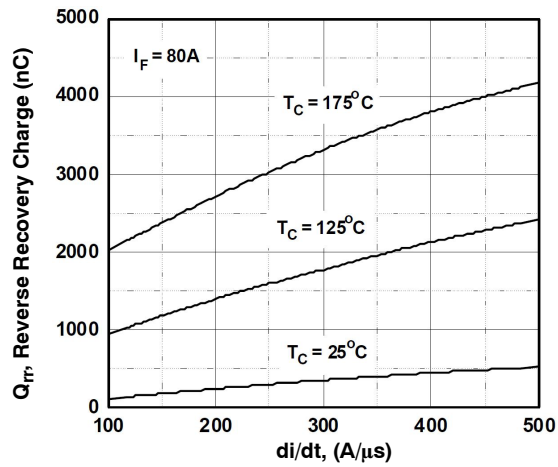


Figure 11. Reverse Recovery Charge

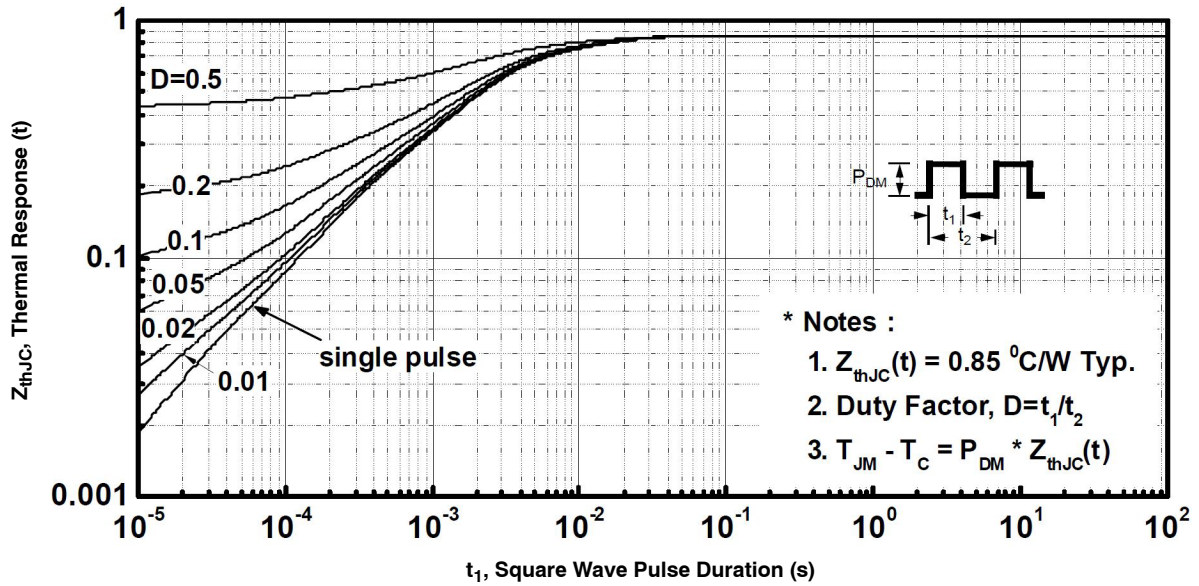


Figure 12. Transient Thermal Response Curve



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