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October 2015

# RURG80100\_F085

## 80A, 1000V Ultrafast Rectifier

### Features

- Ultrafast and soft recovery
- Low Forward Voltage ( $V_F=1.56V(Typ.) @ I_F=80A$ )
- High Speed Switching ( $t_{rr}=242ns(Typ.) @ I_F=80A$ )
- Avalanche Energy Rated
- AEC-Q101 Qualified

### Applications

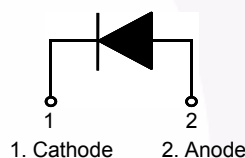
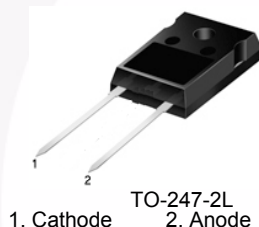
- EV and HEV On-Board Charger
- Stationary Charger
- Other Automotive Applications
- General Power Supply Requiring Higher Reliability

### Description

The RURG80100\_F085 is an Ultrafast™ diode with low forward voltage drop and soft recovery characteristics. Its low voltage drop and ultrafast soft recovery minimize conduction loss and electrical noise in power switching circuit. Meanwhile, the robust design and high quality manufacture process make it a reliable device for heavy duty automotive applications.

This device is intended to be used in a variety of automotive power-train applications for purposes like freewheeling, clamping, rectification, bootstrap and snubber, etc. It's also an ideal device for non-automotive applications which requires a higher reliability performance.

### Pin Assignments



### Absolute Maximum Ratings

 $T_C = 25^\circ C$  unless otherwise noted

Symbol	Parameter	Ratings	Units
$V_{RRM}$	Peak Repetitive Reverse Voltage	1000	V
$V_{RWM}$	Working Peak Reverse Voltage	1000	V
$V_R$	DC Blocking Voltage	1000	V
$I_{F(AV)}$	Average Rectified Forward Current @ $T_C = 25^\circ C$	80	A
$I_{FSM}$	Non-repetitive Peak Surge Current (Halfwave 1 Phase 50Hz)	240	A
$E_{AVL}$	Avalanche Energy (1.6A, 40mH)	50	mJ
$T_J, T_{STG}$	Operating Junction and Storage Temperature	- 55 to +175	$^\circ C$

### Thermal Characteristics

 $T_C = 25^\circ C$  unless otherwise noted

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Maximum Thermal Resistance, Junction to Case	0.3	$^\circ C/W$
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient	45	$^\circ C/W$

### Package Marking and Ordering Information

Device Marking	Device	Package	Tube	Quantity
RURG80100	RURG80100_F085	TO-247	-	30

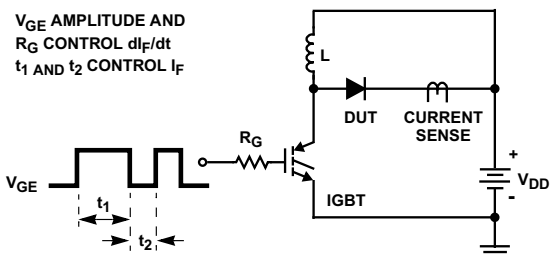
## Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units
$I_R$	Instantaneous Reverse Current	$V_R = 1000\text{V}$	$T_C = 25^\circ\text{C}$	-	-	250 $\mu\text{A}$
			$T_C = 175^\circ\text{C}$	-	-	1.5 $\text{mA}$
$V_{FM}^1$	Instantaneous Forward Voltage	$I_F = 80\text{A}$	$T_C = 25^\circ\text{C}$	-	1.56	2.0 $\text{V}$
			$T_C = 175^\circ\text{C}$	-	1.35	1.7 $\text{V}$
$t_{rr}^2$	Reverse Recovery Time	$I_F = 1\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$ , $V_{CC} = 650\text{V}$	$T_C = 25^\circ\text{C}$	-	122	158 $\text{ns}$
		$I_F = 80\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$ , $V_{CC} = 650\text{V}$	$T_C = 25^\circ\text{C}$	-	242	314 $\text{ns}$
			$T_C = 175^\circ\text{C}$	-	979	- $\text{ns}$
$t_a$	Reverse Recovery Time	$I_F = 80\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}$ , $V_{CC} = 650\text{V}$	$T_C = 25^\circ\text{C}$	-	74	- $\text{ns}$
$t_b$	Reverse Recovery Time			-	168	- $\text{ns}$
$Q_{rr}$	Reverse Recovery Charge			-	751	- $\text{nC}$

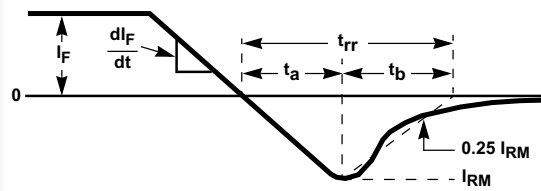
### Notes:

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

## Test Circuit and Waveforms

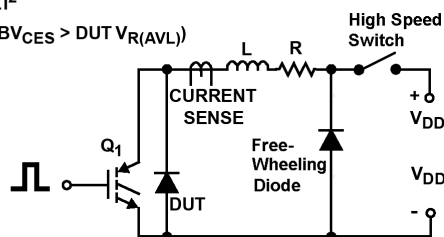


$t_{rr}$  Test Circuit

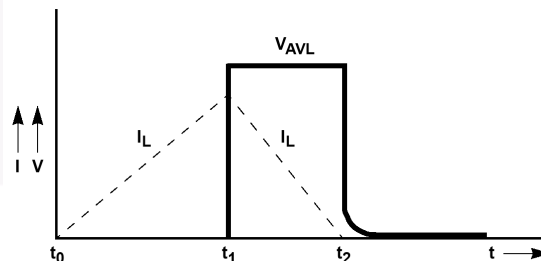


$t_{rr}$  Waveforms and Definitions

$I = 1.6\text{A}$   
 $L = 40\text{mH}$   
 $R < 0.1\Omega$   
 $E_{AVL} = 1/2 L I^2$   
 $Q_1 = \text{IGBT (BV}_{CES} > \text{DUT } V_{R(AVL)})$



Avalanche Energy Test Circuit



Avalanche Current and Voltage Waveforms

## Typical Performance Characteristics

Figure 1. Typical Forward Voltage Drop vs. Forward Current

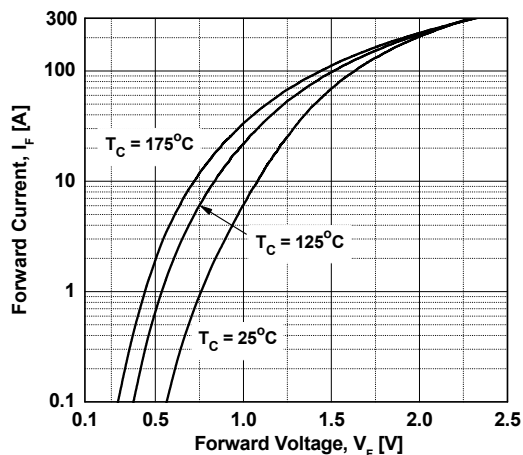


Figure 2. Typical Reverse Current vs. Reverse Voltage

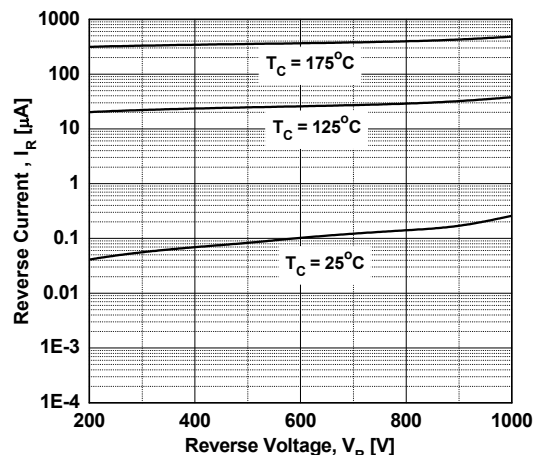


Figure 3. Typical Junction Capacitance

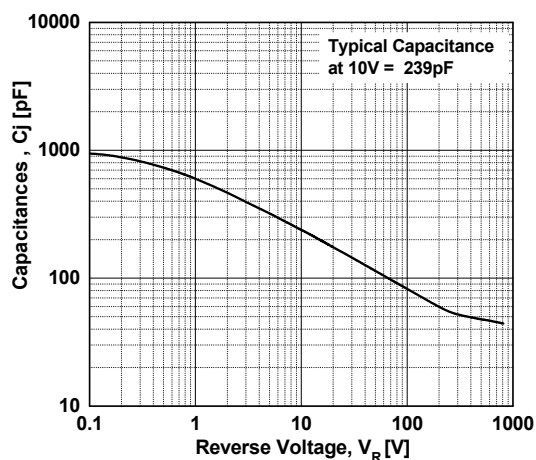


Figure 4. Typical Reverse Recovery Time vs. di/dt

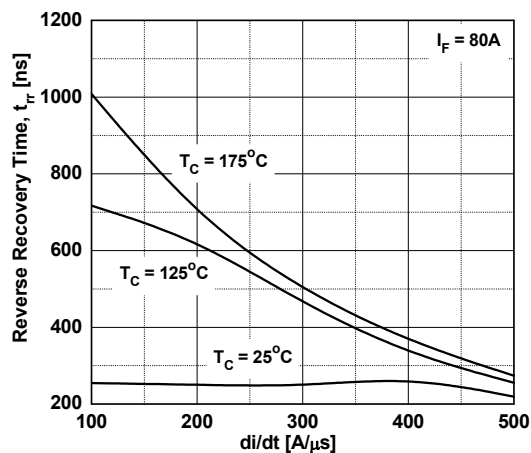


Figure 5. Typical Reverse Recovery Current vs. di/dt

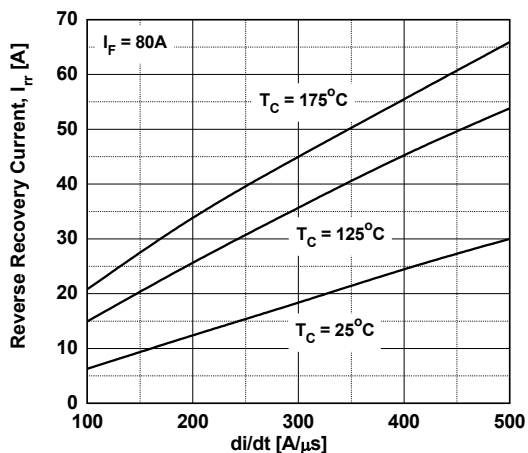
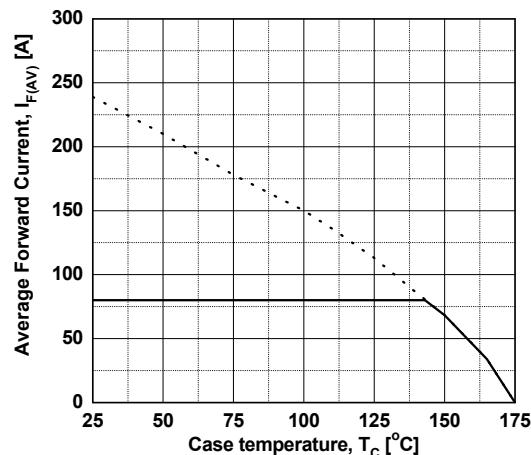


Figure 6. Forward Current Derating Curve



# Typical Performance Characteristics (Continued)

Figure 7. Reverse Recovery Charge

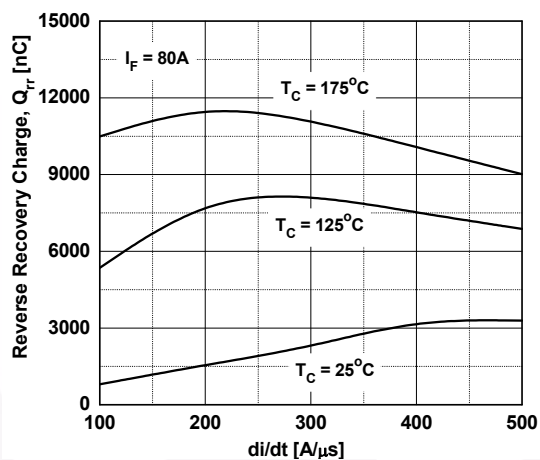
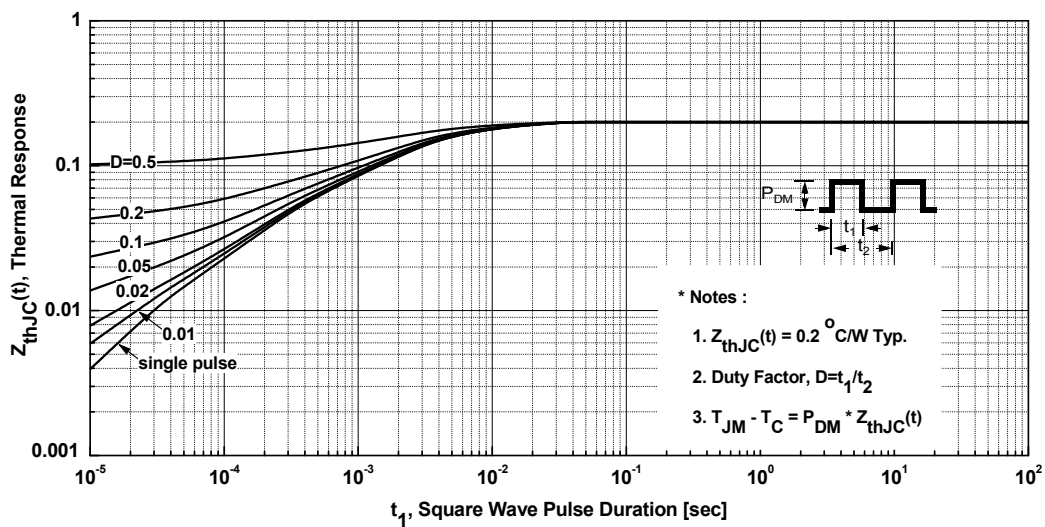



Figure 8. Transient Thermal Response Curve





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