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RURG5060_F085

50A, 600V Ultrafast Rectifier

Features

- High Speed Switching ($t_{rr}=70\text{ns}(\text{Typ.}) @ I_F=50\text{A}$)
- Low Forward Voltage($V_F=1.6\text{V}(\text{Max.}) @ I_F=50\text{A}$)
- Avalanche Energy Rated
- AEC-Q101 Qualified

Applications

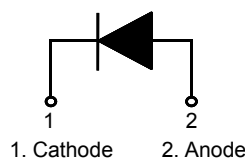
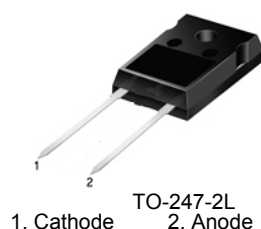
- Automotive DCDC converter
- Automotive On Board Charger
- Switching Power Supply
- Power Switching Circuits

50A, 600V Ultrafast Rectifier

The RURG5060_F085 is an ultrafast diode with soft recovery characteristics ($t_{rr}< 90\text{ns}$). It has low forward voltage drop and is 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 switching power supplies and other power switching applications. Its low stored charge and ultrafast recovery with soft recovery characteristic minimizes 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	0.4	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient	45	$^\circ\text{C}/\text{W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Tube	Quantity
RURG5060	RURG5060_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
			$T_C = 175^\circ\text{C}$	-	-	2 mA
V_{FM}^1	Instantaneous Forward Voltage	$I_F = 50\text{A}$	$T_C = 25^\circ\text{C}$	-	1.28	1.6 V
			$T_C = 175^\circ\text{C}$	-	1.09	1.4 V
t_{rr}^2	Reverse Recovery Time	$I_F = 1\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{CC} = 390\text{V}$	$T_C = 25^\circ\text{C}$	-	42	65 ns
		$I_F = 50\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{CC} = 390\text{V}$	$T_C = 25^\circ\text{C}$ $T_C = 175^\circ\text{C}$	- -	70 285	90 - ns
t_a	Reverse Recovery Time	$I_F = 50\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{CC} = 390\text{V}$	$T_C = 25^\circ\text{C}$	-	36	- ns
t_b	Reverse Recovery Time	$I_F = 50\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{CC} = 390\text{V}$	$T_C = 25^\circ\text{C}$	-	34	- ns
Q_{rr}	Reverse Recovery Charge	$I_F = 50\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{CC} = 390\text{V}$	$T_C = 25^\circ\text{C}$	-	112	- nC
E_{AVL}	Avalanche Energy	$I_{AV} = 1.4\text{A}$, $L = 40\text{mH}$	40	-	-	mJ

Notes:

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

Test Circuit and Waveforms

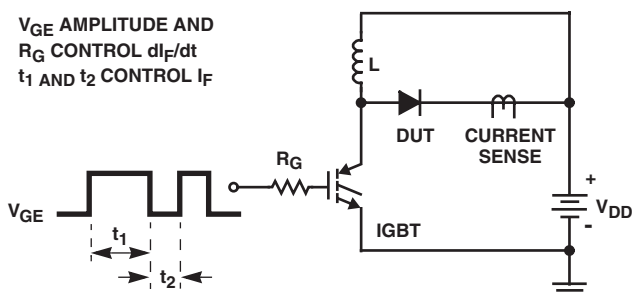


FIGURE 5. t_{rr} TEST CIRCUIT

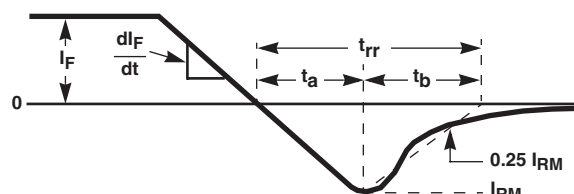


FIGURE 6. t_{rr} WAVEFORMS AND DEFINITIONS

$I = 1.4\text{A}$
 $L = 40\text{mH}$
 $R < 0.1\Omega$
 $E_{AVL} = 1/2 L I^2 [V_R(AVL)/(V_R(AVL) - V_{DD})]$
 $Q_1 = \text{IGBT (BV}_{CES} > \text{DUT } V_R(AVL))$

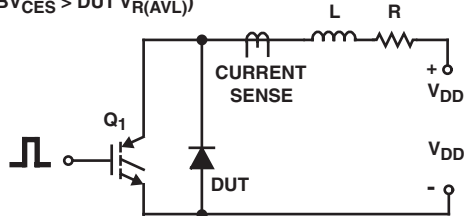


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

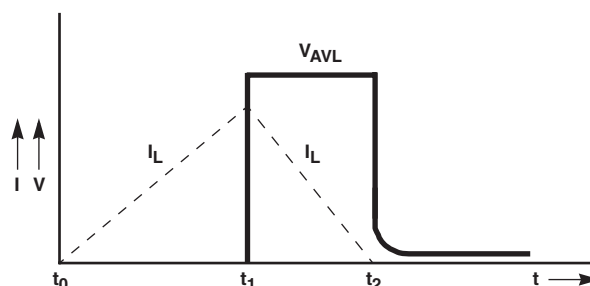


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Typical Performance Characteristics

Figure 1. Typical Forward Voltage Drop vs. Forward Current

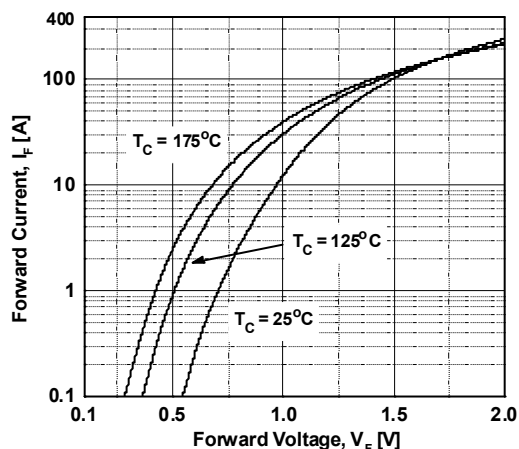


Figure 2. Typical Reverse Current vs. Reverse Voltage

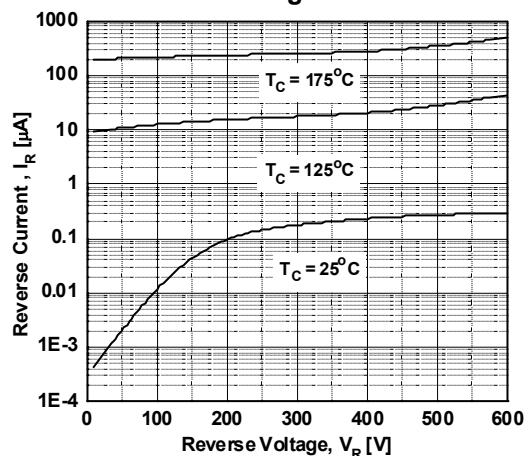


Figure 3. Typical Junction Capacitance

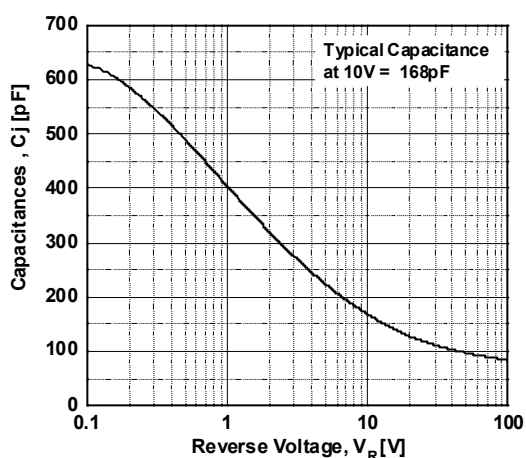


Figure 4. Typical Reverse Recovery Time vs. di/dt

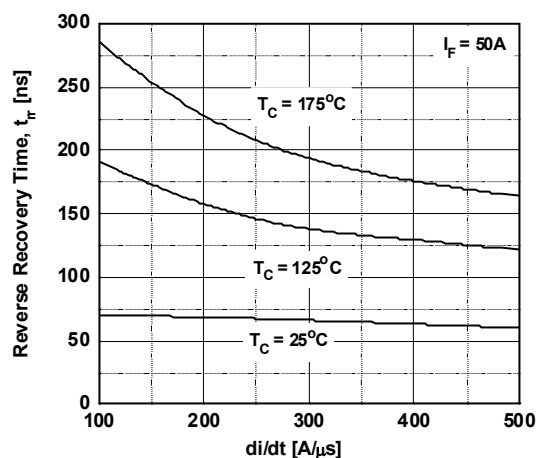


Figure 5. Typical Reverse Recovery Current vs. di/dt

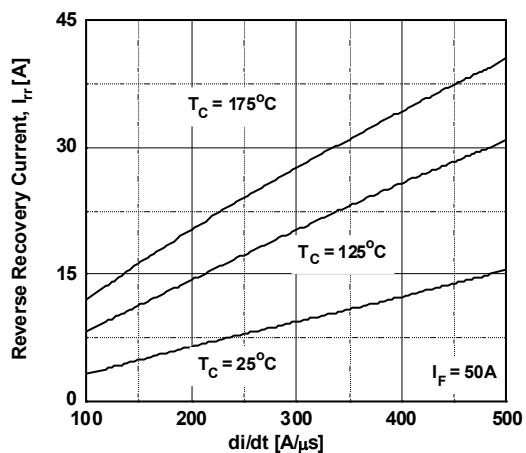
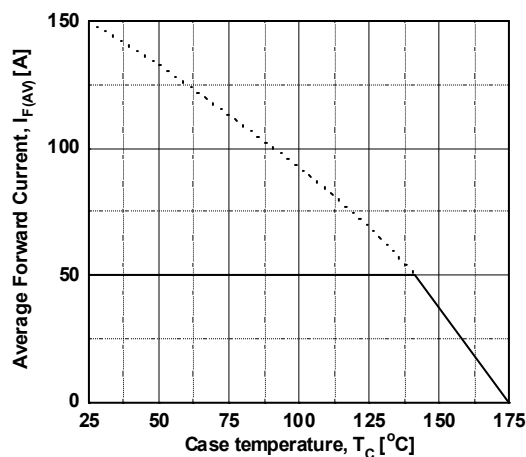


Figure 6. Forward Current Derating Curve



Typical Performance Characteristics (Continued)

Figure 7. Reverse Recovery Charge

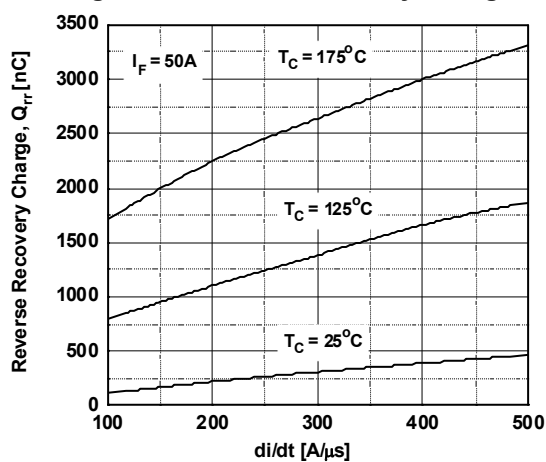
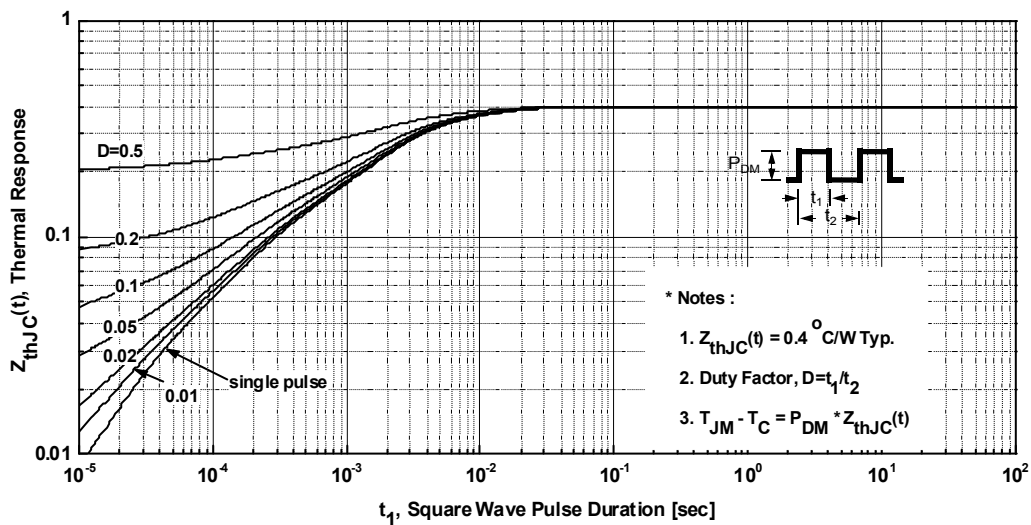
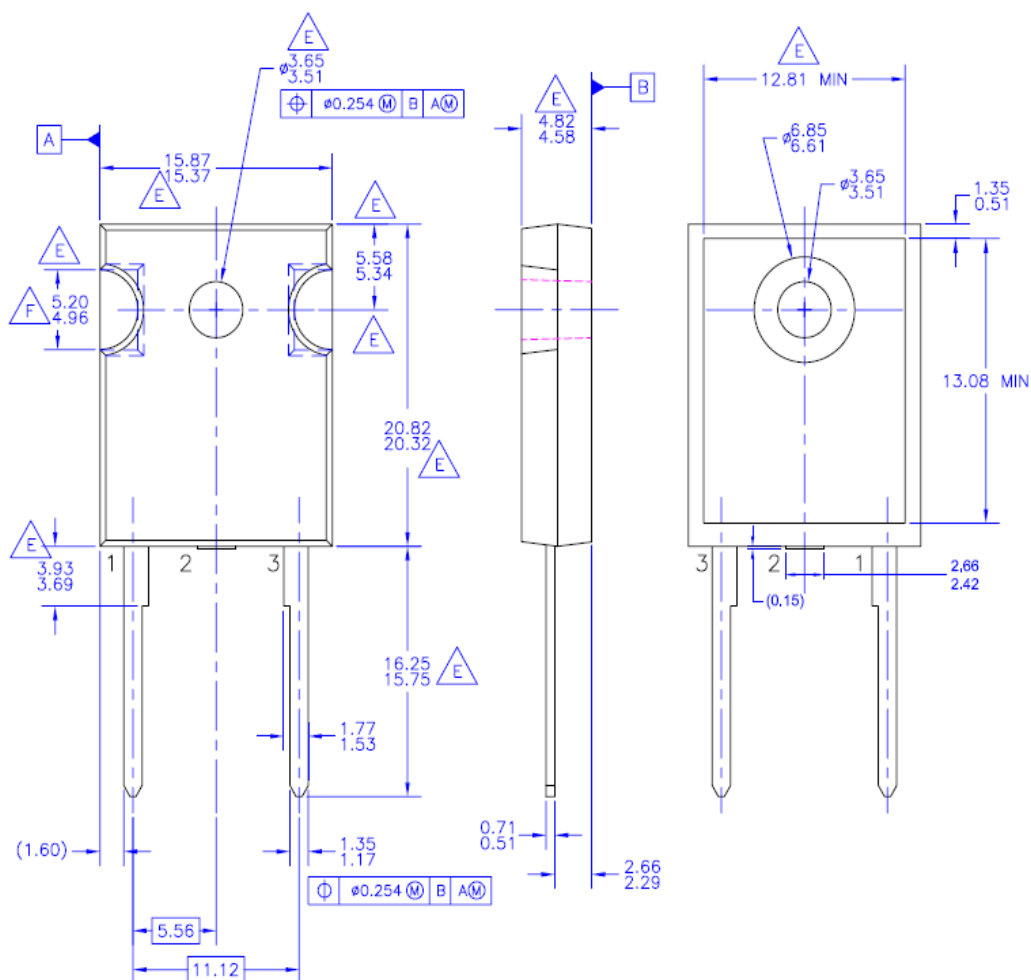


Figure 8. Transient Thermal Response Curve



Mechanical Dimensions

TO-247-2L



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