



ON Semiconductor®

RURG5060-F085 50A, 600V Ultrafast Rectifier

Features

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

Applications

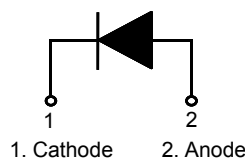
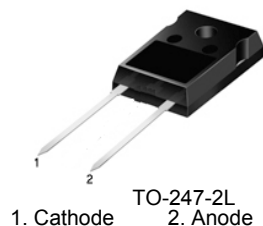
- Automotive DCDC converter
- Automotive On Board Charger
- Switching Power Supply
- Power Switching Circuits

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 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Maximum Thermal Resistance, Junction to Ambient | 45 | $^\circ\text{C/W}$ |

Package Marking and Ordering Information

| Device Marking | Device | Package | Tube | Quantity |
|----------------|---------------|---------|------|----------|
| RURG5060 | RURG5060-F085 | TO-247 | - | 30 |

Electrical Characteristics T_C = 25°C unless otherwise noted

| Symbol | Parameter | Conditions | Min. | Typ. | Max | Units | |
|------------------------------|-------------------------------|---|-------------------------|------|------|-------|----|
| I _R | Instantaneous Reverse Current | V _R = 600V | T _C = 25 °C | - | - | 250 | uA |
| | | | T _C = 175 °C | - | - | 2 | mA |
| V _{FM} ¹ | Instantaneous Forward Voltage | I _F = 50A | T _C = 25 °C | - | 1.28 | 1.6 | V |
| | | | T _C = 175 °C | - | 1.09 | 1.4 | V |
| t _{rr} ² | Reverse Recovery Time | I _F = 1A, di/dt = 100A/μs, V _{CC} = 390V | T _C = 25 °C | - | 42 | 65 | ns |
| | | I _F = 50A, di/dt = 100A/μs, V _{CC} = 390V | T _C = 25 °C | - | 70 | 90 | ns |
| | | | T _C = 175 °C | - | 285 | - | ns |
| t _a | Reverse Recovery Time | I _F = 50A, di/dt = 100A/μs, V _{CC} = 390V | T _C = 25 °C | - | 36 | - | ns |
| t _b | Reverse Recovery Time | | | - | 34 | - | ns |
| Q _{rr} | Reverse Recovery Charge | | | - | 112 | - | nC |
| E _{AVL} | Avalanche Energy | I _{AV} = 1.4A, L = 40mH | 40 | - | - | mJ | |

Notes:

1. Pulse : Test Pulse width = 300μs, Duty Cycle = 2%
2. Guaranteed by design

Test Circuit and Waveforms

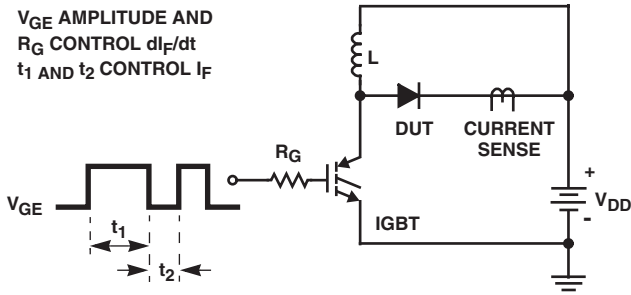


FIGURE 5. t_{rr} TEST CIRCUIT

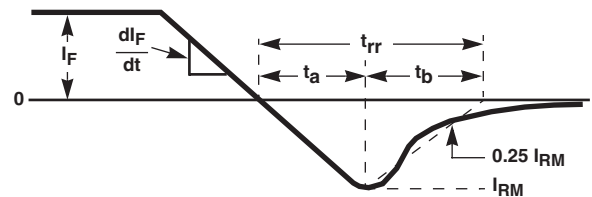


FIGURE 6. t_{rr} WAVEFORMS AND DEFINITIONS

I = 1.4A
L = 40mH
R < 0.1Ω
E_{AVL} = 1/2L I² [V_{R(AVL)} / (V_{R(AVL)} - V_{DD})]
Q₁ = IGBT (BV_{CES} > DUT V_{R(AVL)})

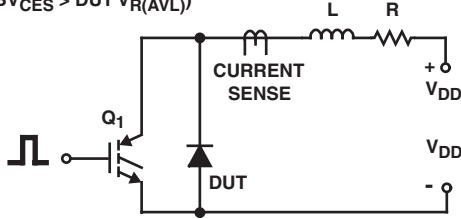


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

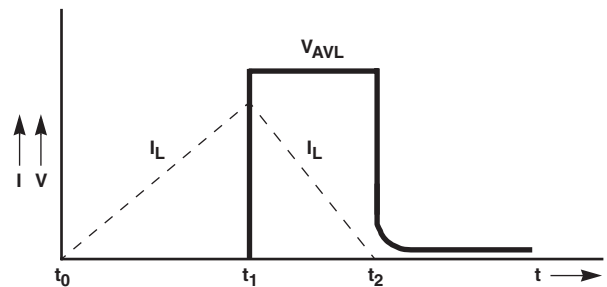


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Typical Performance Characteristics

Figure 1. Typical Forward Voltage Drop vs. Forward Current

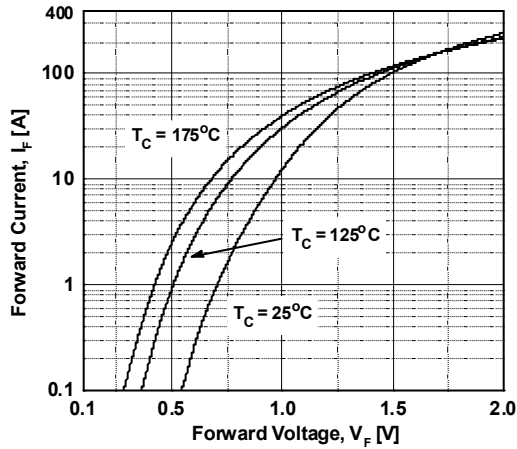


Figure 3. Typical Junction Capacitance

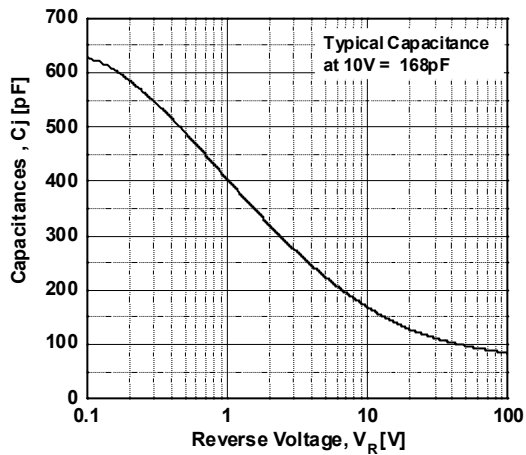


Figure 5. Typical Reverse Recovery Current vs. di/dt

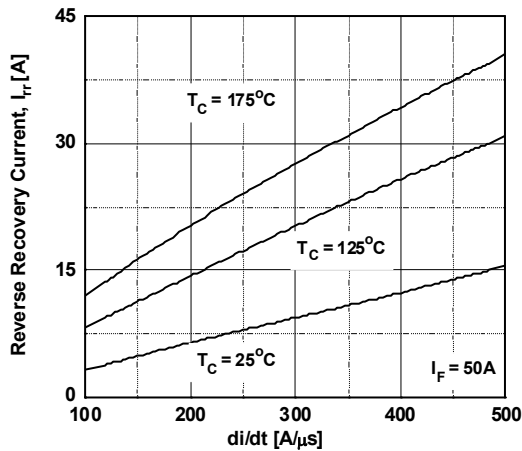


Figure 2. Typical Reverse Current vs. Reverse Voltage

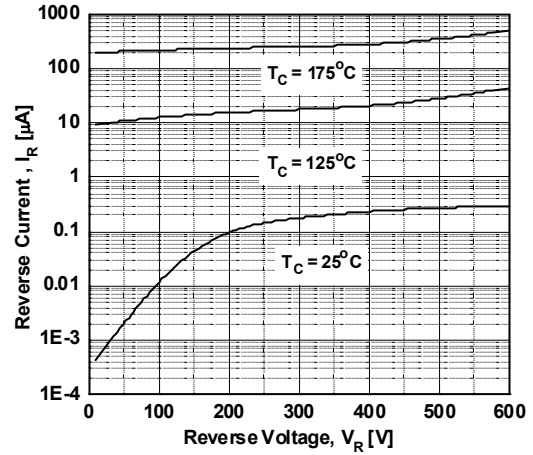


Figure 4. Typical Reverse Recovery Time vs. di/dt

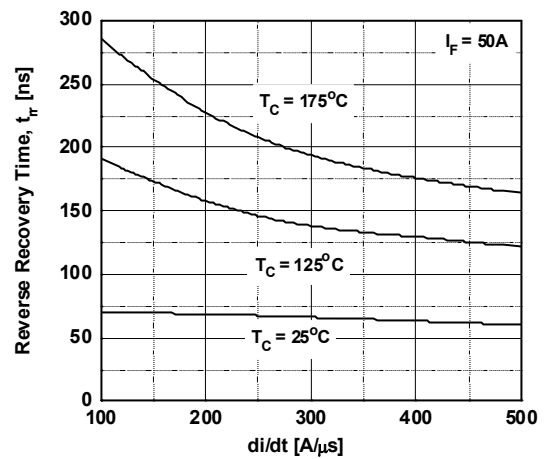
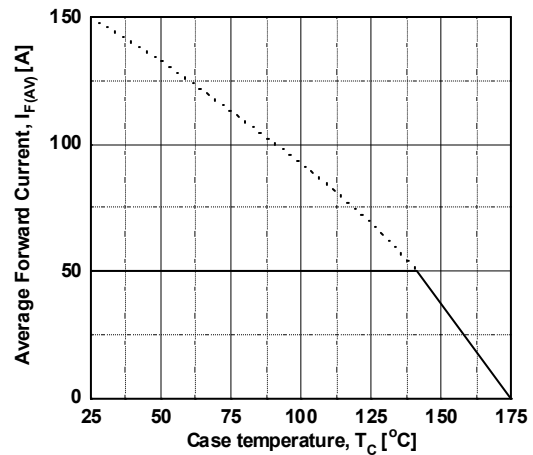


Figure 6. Forward Current Derating Curve



Typical Performance Characteristics (Continued)

Figure 7. Reverse Recovery Charge

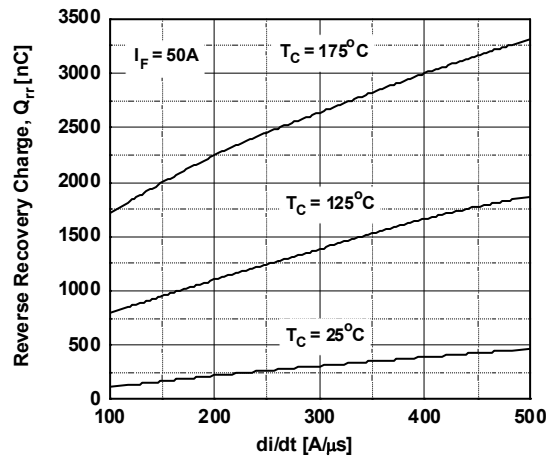
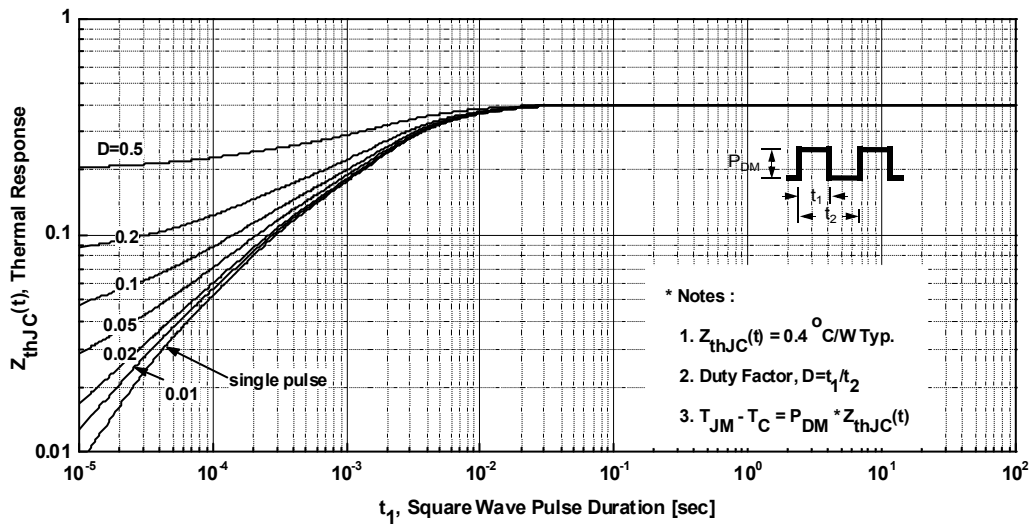
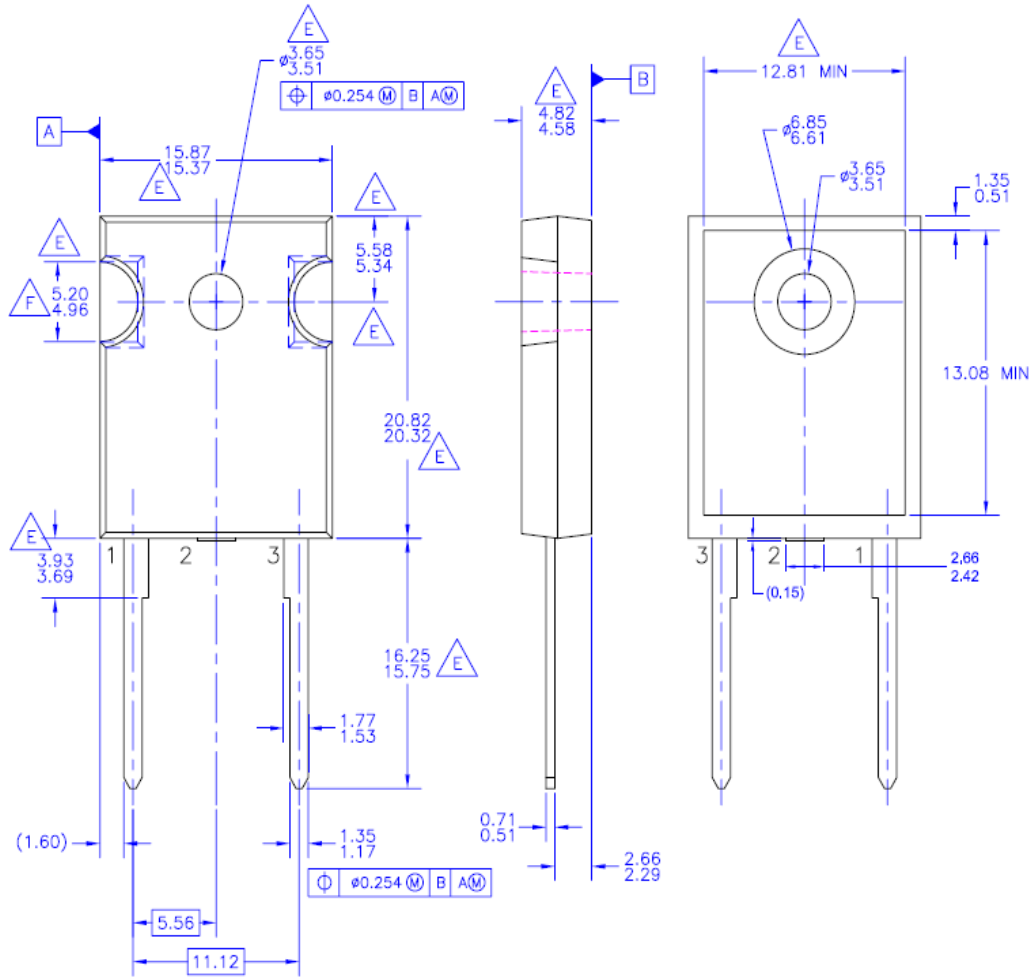


Figure 8. Transient Thermal Response Curve



Mechanical Dimensions

TO-247-2L



- NOTES: UNLESS OTHERWISE SPECIFIED
- A. PACKAGE REFERENCE: JEDEC TO-247, ISSUE E, VARIATION AB, DATED JUNE, 2004.
 - B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
 - 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