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RURP15100_F085 15A 1000V Ultrafast Rectifier

Features

- High Speed Switching ($t_{rr}=200\text{ns(Typ.)}$) @ $I_F=15\text{A}$)
- Low Forward Voltage($V_F=1.8\text{V(Max.)}$) @ $I_F=15\text{A}$)
- Avalanche Energy Rated
- AEC-Q101 Compliant

Applications

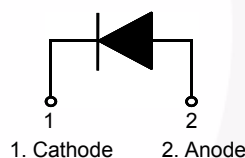
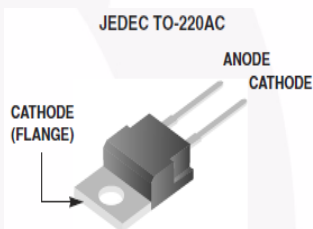
- Automotive DCDC converter
- Automotive On Board Charger
- Switching Power Supply
- Power Switching Circuits

15A, 1000V Ultrafast Rectifier

The RURP15100_F085 is an ultrafast diode with soft recovery characteristics ($t_{rr}< 200\text{ns}$). It has a low forward voltage drop and is of silicon nitride passivated, ion-implanted, epitaxial construction.

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

Pin Assignments



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ 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 @ $T_C = 25^\circ\text{C}$ | 15 | A |
| I_{FSM} | Non-repetitive Peak Surge Current | 45 | A |
| E_{AVL} | Avalanche Energy(1A,40mH) | 20 | mJ |
| T_J, T_{STG} | Operating Junction and Storage Temperature | - 55 ~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 | 0.94 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Maximum Thermal Resistance, Junction to Ambient | 85 | $^\circ\text{C/W}$ |

Package Marking and Ordering Information

| Device Marking | Device | Package | Tube | Quantity |
|----------------|----------------|----------|------|----------|
| RURP15100 | RURP15100_F085 | TO-220AC | - | 50 |

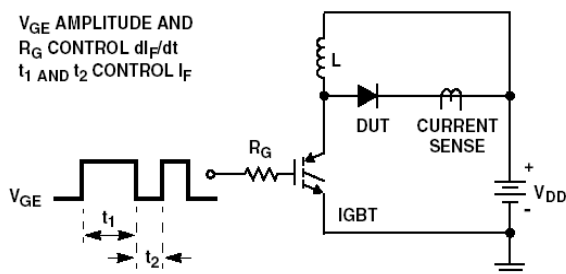
Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Conditions | Min. | Typ. | Max | Units |
|----------------------------|-------------------------------|---|------|------|------|---------------|
| I_R | Instantaneous Reverse Current | $V_R = 1000\text{V}$ | | | | |
| | | $T_C = 25^\circ\text{C}$ | - | - | 100 | μA |
| | | $T_C = 175^\circ\text{C}$ | - | - | 1000 | μA |
| V_F^1 | Instantaneous Forward Voltage | $I_F = 15\text{A}$ | | | | |
| | | $T_C = 25^\circ\text{C}$ | - | 1.35 | 1.8 | V |
| | | $T_C = 175^\circ\text{C}$ | - | 1.14 | 1.6 | V |
| t_{rr}^2 | Reverse Recovery Time | $I_F = 1\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_R = 650\text{V}$ | | | | |
| | | $T_C = 25^\circ\text{C}$ | - | 126 | 260 | ns |
| | | $I_F = 15\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_R = 650\text{V}$ | | | | |
| | | $T_C = 25^\circ\text{C}$ | - | 200 | 450 | ns |
| | | $T_C = 175^\circ\text{C}$ | - | 720 | - | ns |
| t_a t_b Q_{rr} | Reverse Recovery Time | $I_F = 15\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_R = 650\text{V}$ | | | | |
| | | $T_C = 25^\circ\text{C}$ | - | 63 | - | ns |
| | | | - | 137 | - | ns |
| | Reverse Recovery Charge | | - | 683 | - | nC |
| W_{AVL} | Avalanche Energy | $I_{AV} = 1.0\text{A}$, $L = 40\text{mH}$ | 20 | - | - | mJ |

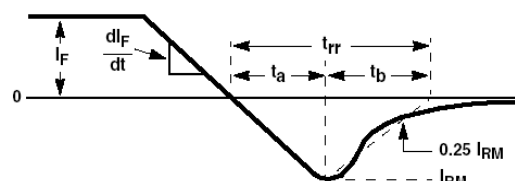
Notes:

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

Test Circuit and Waveforms

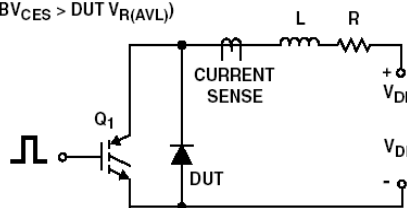


t_{rr} TEST CIRCUIT

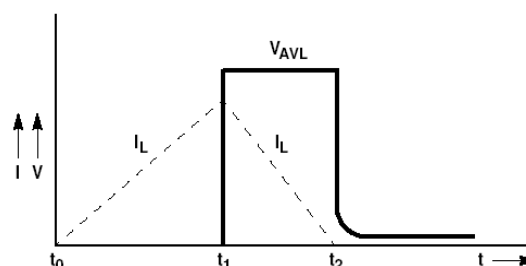


t_{rr} WAVEFORMS AND DEFINITIONS

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



AVALANCHE ENERGY TEST CIRCUIT



AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Typical Performance Characteristics

Figure 1. Typical Forward Voltage Drop vs. Forward Current

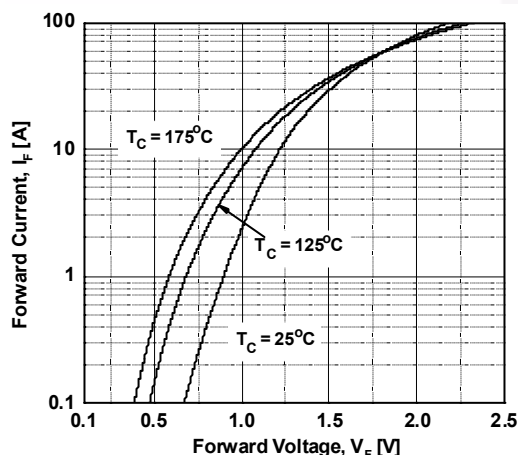


Figure 2. Typical Reverse Current vs. Reverse Voltage

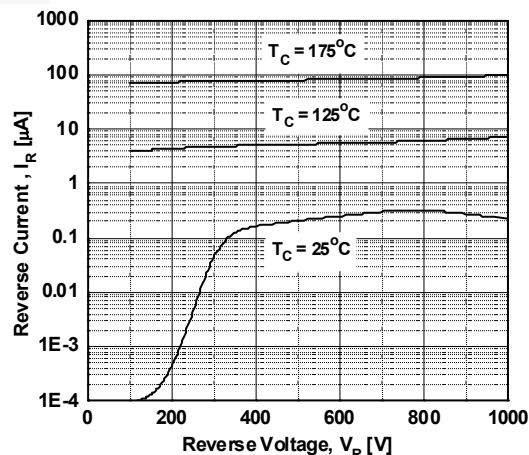


Figure 3. Typical Junction Capacitance

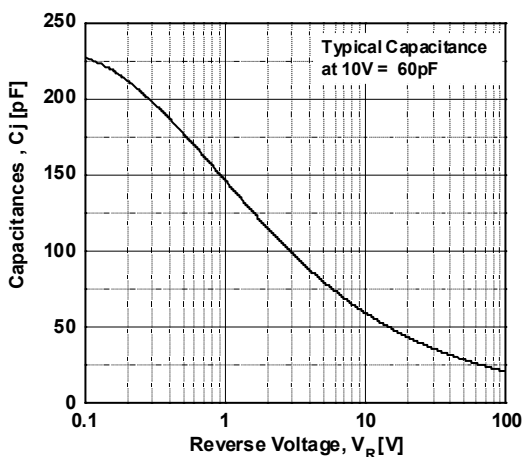


Figure 4. Typical Reverse Recovery Time vs. di/dt

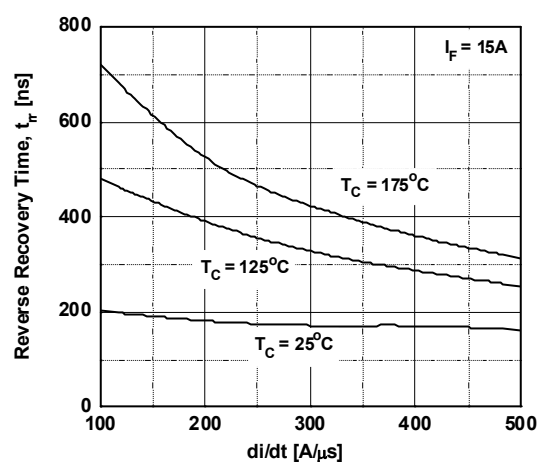


Figure 5. Typical Reverse Recovery Current vs. di/dt

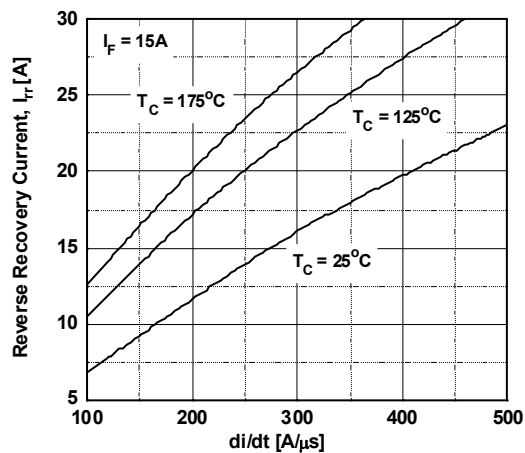
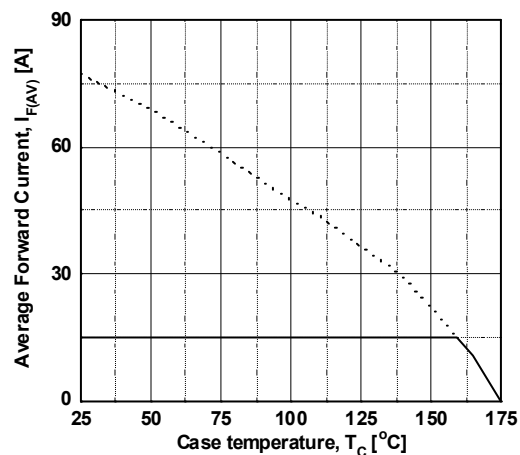


Figure 6. Forward Current Derating Curve



Typical Performance Characteristics (Continued)

Figure 7. Reverse Recovery Charge

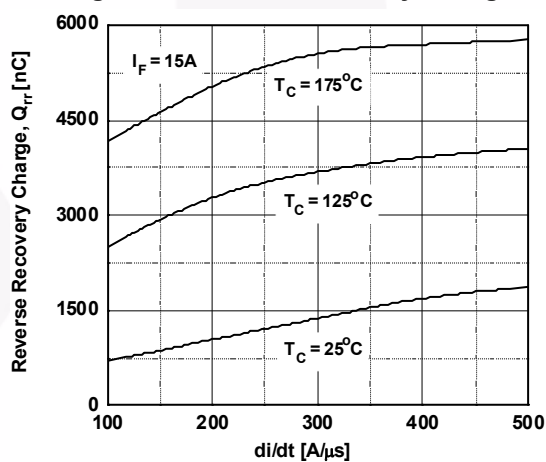
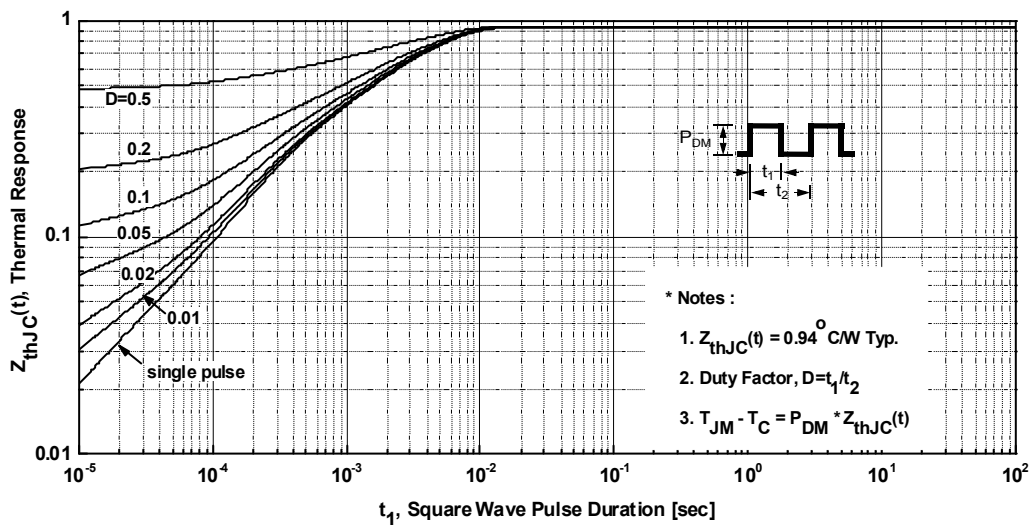
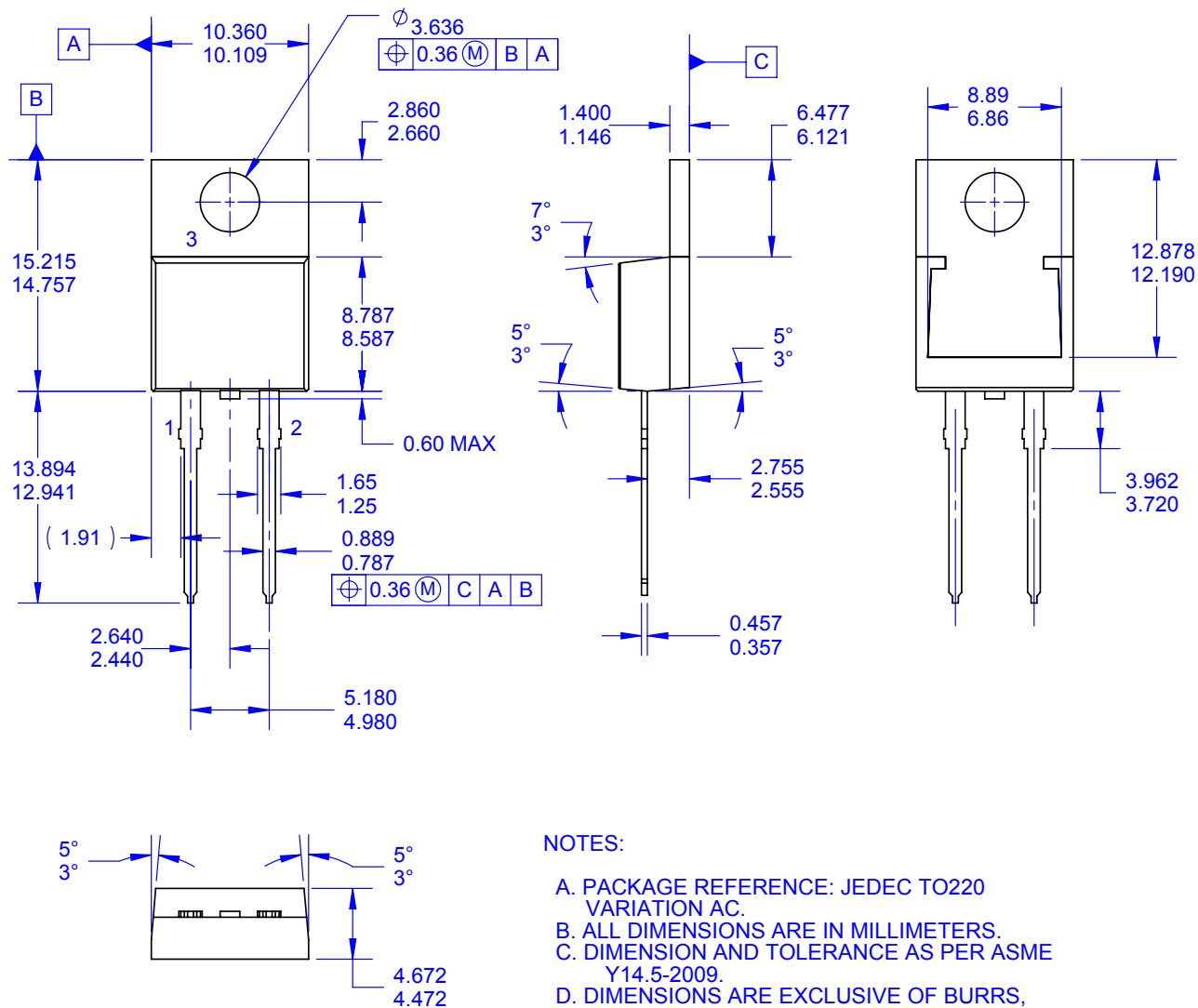


Figure 8. Transient Thermal Response Curve



Mechanical Dimensions

TO-220-2L



NOTES:

- PACKAGE REFERENCE: JEDEC TO220 VARIATION AC.
- ALL DIMENSIONS ARE IN MILLIMETERS.
- DIMENSION AND TOLERANCE AS PER ASME Y14.5-2009.
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Dimensions in Millimeters



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