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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

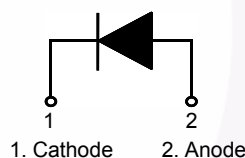
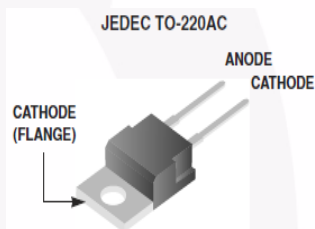
- Automotive DCDC converter
- Automotive On Board Charger
- Switching Power Supply
- Power Switching Circuits

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

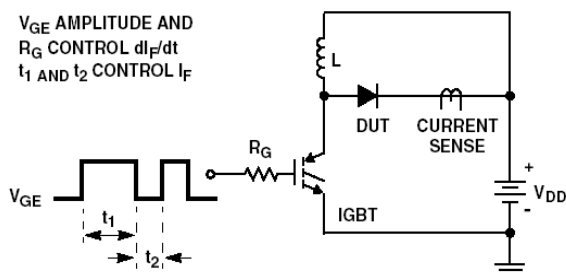
Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

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

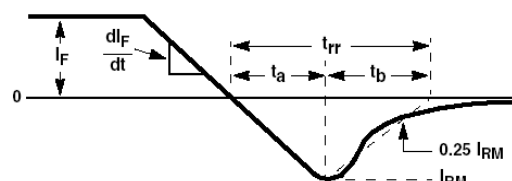
Notes:

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

Test Circuit and Waveforms

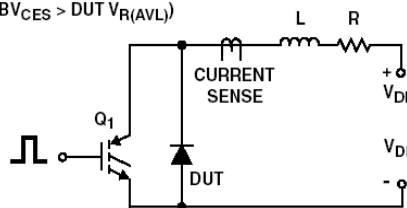


t_{rr} TEST CIRCUIT

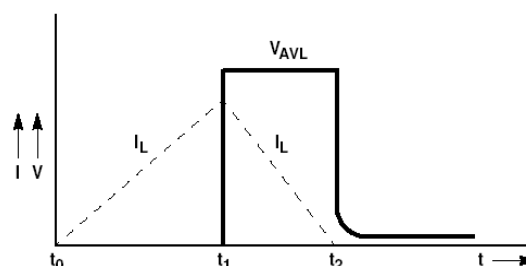


t_{rr} WAVEFORMS AND DEFINITIONS

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



AVALANCHE ENERGY TEST CIRCUIT



AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Typical Performance Characteristics

Figure 1. Typical Forward Voltage Drop vs. Forward Current

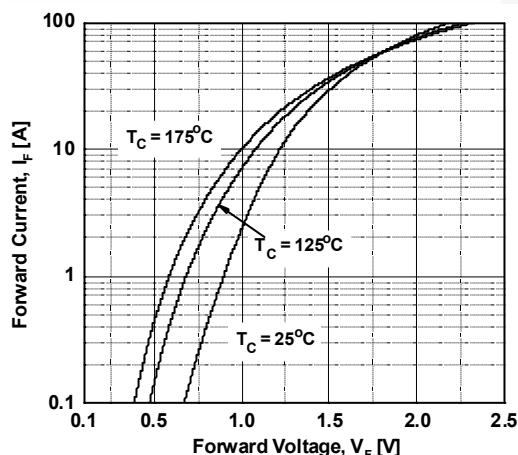


Figure 2. Typical Reverse Current vs. Reverse Voltage

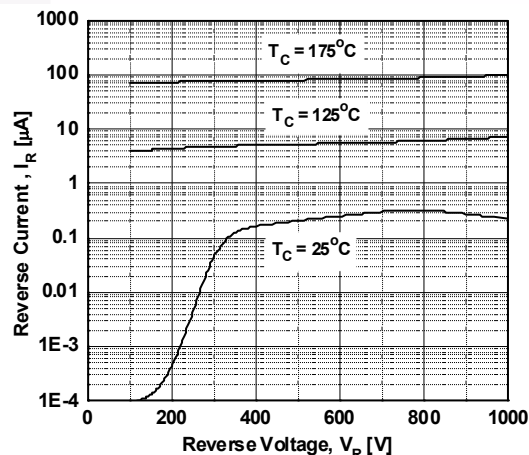


Figure 3. Typical Junction Capacitance

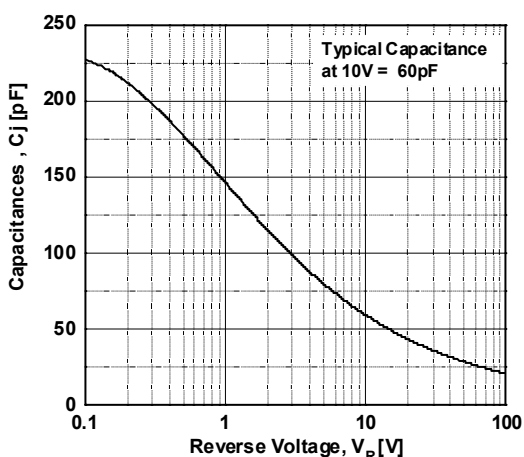


Figure 4. Typical Reverse Recovery Time vs. di/dt

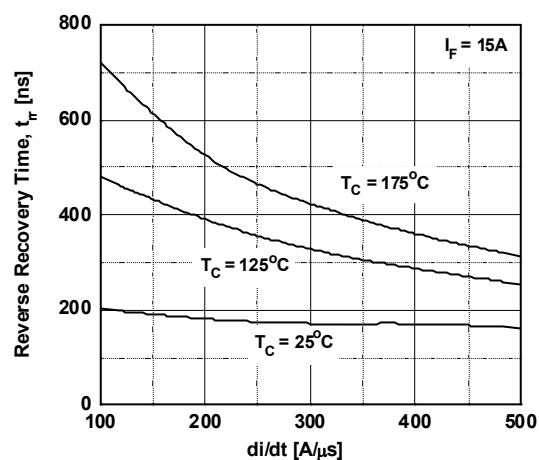


Figure 5. Typical Reverse Recovery Current vs. di/dt

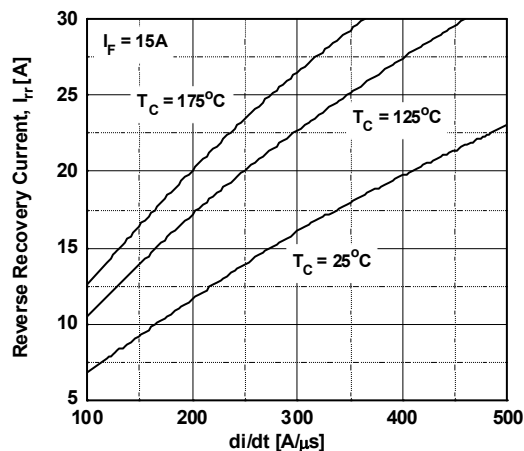
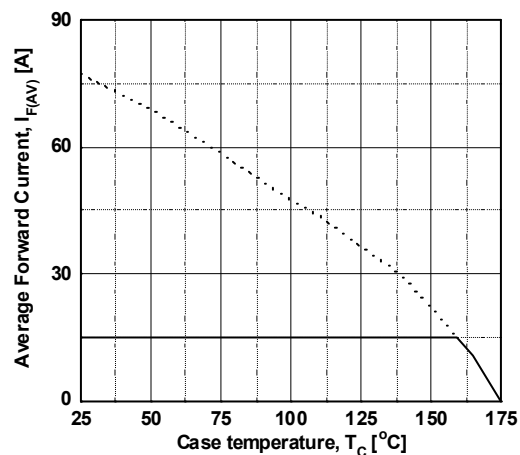


Figure 6. Forward Current Derating Curve



Typical Performance Characteristics (Continued)

Figure 7. Reverse Recovery Charge

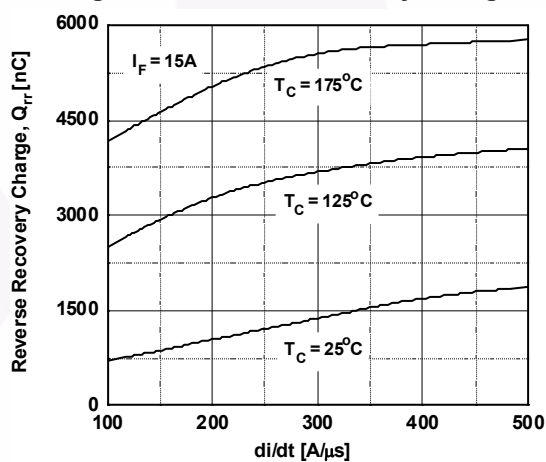
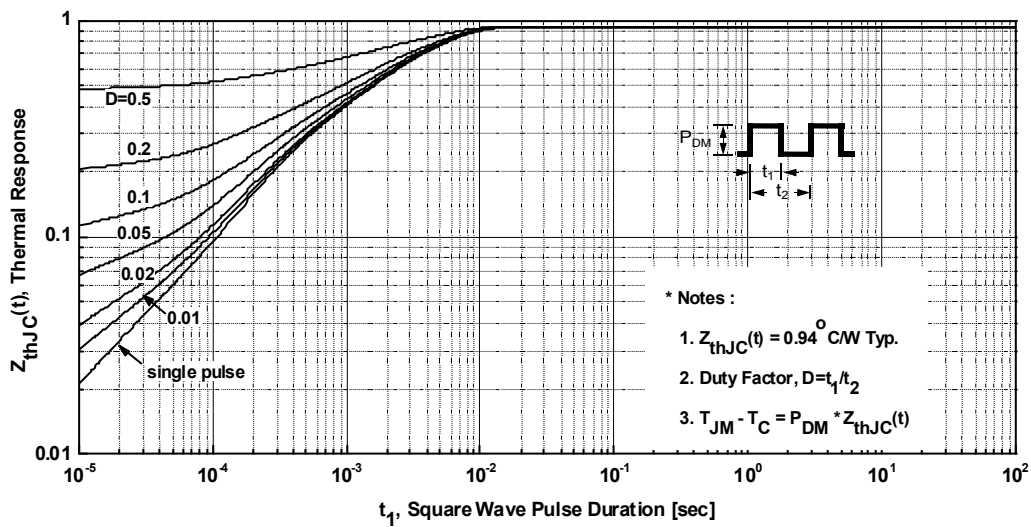


Figure 8. Transient Thermal Response Curve



MECHANICAL DRAWING OF A JEDEC TO220 PACKAGE (VARIATION AC).

VIEW 1 (FRONT):

- Overall Width: 10.360 (Top), 10.109 (Bottom)
- Body Width: 8.89 (Top), 6.86 (Bottom)
- Lead Spacing: 2.640 (Top), 2.440 (Bottom)
- Lead Width: 1.65 (Top), 1.25 (Bottom)
- Lead Thickness: 0.889 (Top), 0.787 (Bottom)
- Lead Angle: 5° (Top), 3° (Bottom)
- Body Thickness: 15.215 (Top), 14.757 (Bottom)
- Body Height: 13.894 (Top), 12.941 (Bottom)
- Body Feature (3): 3.636 (Top), 0.36 (Bottom)
- Body Feature (C): 0.36 (Top), 0.36 (Bottom)

VIEW 2 (SIDE):

- Overall Height: 12.878 (Top), 12.190 (Bottom)
- Lead Height: 3.962 (Top), 3.720 (Bottom)
- Lead Angle: 5° (Top), 3° (Bottom)
- Body Thickness: 0.60 MAX
- Body Feature (C): 0.36 (Top), 0.36 (Bottom)

VIEW 3 (TOP):

- Overall Width: 10.360 (Top), 10.109 (Bottom)
- Body Width: 8.89 (Top), 6.86 (Bottom)
- Lead Spacing: 2.640 (Top), 2.440 (Bottom)
- Lead Width: 1.65 (Top), 1.25 (Bottom)
- Lead Thickness: 0.889 (Top), 0.787 (Bottom)
- Lead Angle: 5° (Top), 3° (Bottom)
- Body Thickness: 15.215 (Top), 14.757 (Bottom)
- Body Height: 13.894 (Top), 12.941 (Bottom)
- Body Feature (3): 3.636 (Top), 0.36 (Bottom)
- Body Feature (C): 0.36 (Top), 0.36 (Bottom)

NOTES:

- PACKAGE REFERENCE: JEDEC TO220 VARIATION AC.
- ALL DIMENSIONS ARE IN MILLIMETERS.
- DIMENSION AND TOLERANCE AS PER ASME Y14.5-2009.
- DIMENSIONS ARE EXCLUSIVE OF BURRS.

NOTES:

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E. DRAWING FILE NAME: TO220B02REV5
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Dimensions in Millimeters



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