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August 2014

# RURP15100\_F085 15A 1000V Ultrafast Rectifier

#### **Features**

- High Speed Switching (t<sub>rr</sub>=200ns(Typ.) @ I<sub>F</sub>=15A)
- Low Forward Voltage(V<sub>F</sub>=1.8V(Max.) @ I<sub>F</sub>=15A)
- · Avalanche Energy Rated
- · AEC-Q101 Compliant

### **Applications**

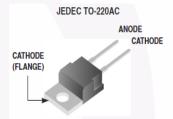
- · Automotive DCDC converter
- · Automotive On Board Charger
- · Switching Power Supply
- · Power Switching Circuits

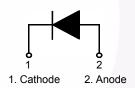
#### 15A, 1000V Ultrafast Rectifier

The RURP15100\_F085 is an ultrafast diode with soft recovery characteristics (trr< 200ns). It has a low forward voltage drop and is of silicon nitride passivated, ionimplanted, 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<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units	
V <sub>RRM</sub>	Peak Repetitive Reverse Voltage	1000	V	
$V_{RWM}$	Working Peak Reverse Voltage 1000			
$V_R$	DC Blocking Voltage 1000			
I <sub>F(AV)</sub>	Average Rectified Forward Current @ T <sub>C</sub> = 25°C	15	Α	
I <sub>FSM</sub>	Non-repetitive Peak Surge Current	45	Α	
E <sub>AVL</sub>	Avalanche Energy(1A,40mH)	20	mJ	
T <sub>J,</sub> T <sub>STG</sub>	Operating Junction and Storage Temperature - 55 ~175		°C	

#### Thermal Characteristics T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Max	Units	
$R_{\theta JC}$	Maximum Thermal Resistance, Junction to Case	0.94	°C/W	
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient	85	°C/W	

### **Package Marking and Ordering Information**

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

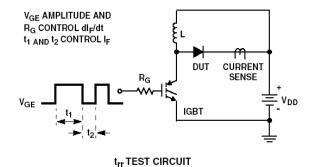
### Electrical Characteristics T<sub>C</sub> = 25°C unless otherwise noted

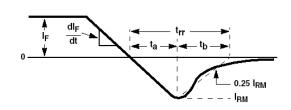
Symbol	Parameter	Conditions		Min.	Тур.	Max	Units
I <sub>R</sub>	Instantaneous Reverse Current	V <sub>R</sub> = 1000V	T <sub>C</sub> = 25 °C	-	-	100	uA
			T <sub>C</sub> = 175 °C	-	-	1000	uA
V <sub>F</sub> <sup>1</sup>	Instantaneous Forward Voltage	I <sub>F</sub> = 15A	T <sub>C</sub> = 25 °C T <sub>C</sub> = 175 °C	-	1.35 1.14	1.8 1.6	V V
t <sub>rr</sub> <sup>2</sup>	Reverse Recovery Time	$I_F = 1A$ , di/dt = 100A/ $\mu$ s, $V_R = 650V$	T <sub>C</sub> = 25 °C	-	126	260	ns
		$I_F = 15A$ , di/dt = 100A/ $\mu$ s, $V_R = 650V$	T <sub>C</sub> = 25 °C T <sub>C</sub> = 175 °C	- -	200 720	450 -	ns ns
t <sub>a</sub> t <sub>b</sub> Q <sub>rr</sub>	Reverse Recovery Time Reverse Recovery Charge	$I_F$ =15A, di/dt = 100A/ $\mu$ s, $V_R$ =650V	T <sub>C</sub> = 25 °C	-	63 137 683	- - -	ns ns nC
W <sub>AVL</sub>	Avalanche Energy	I <sub>AV</sub> =1.0A, L=40mH	•	20	-	-	mJ

#### **Notes**

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

### **Test Circuit and Waveforms**

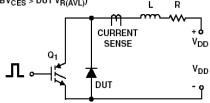




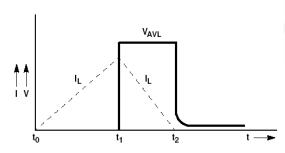
trr WAVEFORMS AND DEFINITIONS

 $I_{MAX} = 1A$  L = 40mH $R < 0.1\Omega$ 

 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$  $Q_1 = IGBT (BV_{CES} > DUT V_{R(AVL)})$ 



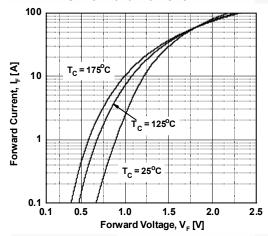
AVALANCHE ENERGY TEST CIRCUIT



AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

### **Typical Performance Characteristics**

Figure 1. Typical Forward Voltage Drop vs. Forward Current



**Figure 3.Typical Junction Capacitance** 

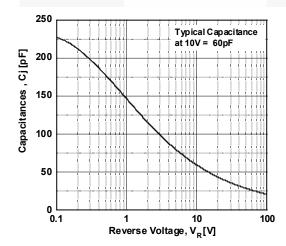


Figure 5. Typical Reverse Recovery Current vs. di/dt

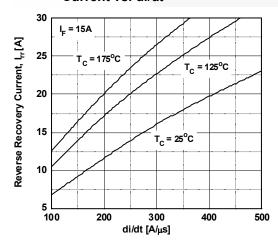


Figure 2. Typical Reverse Current vs.

Reverse Voltage

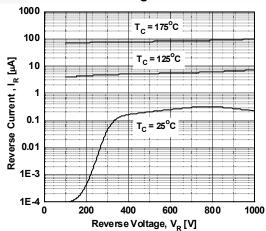


Figure 4. Typical Reverse Recovery Time vs. di/dt

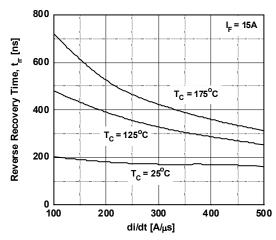
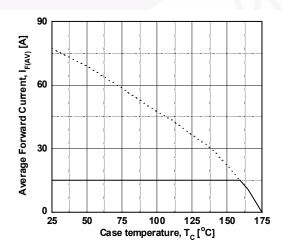


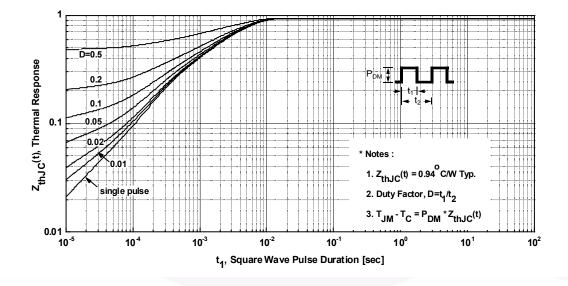
Figure 6. Forward Current Derating Curve



### **Typical Performance Characteristics** (Continued)

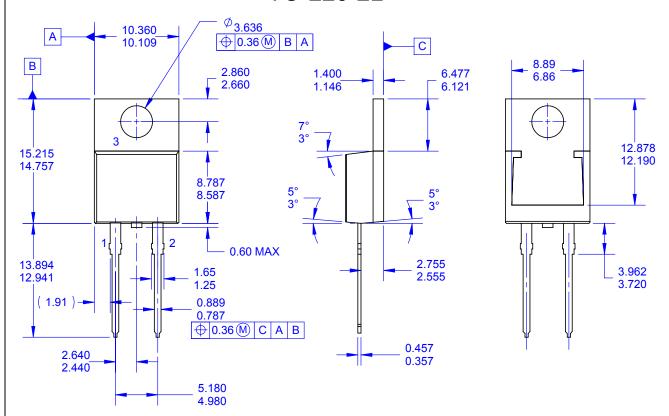
Figure 7. Reverse Recovery Charge 6000 I<sub>E</sub> = 15A Reverse Recovery Charge, Qrr [nC]  $T_C = 175^{\circ}C$ 4500 T<sub>C</sub> = 125°C 3000 1500 T<sub>C</sub> = 25°C 0 L 100 200 300 400 500 di/dt [A/μs]

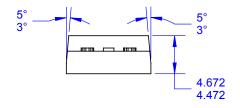
**Figure 8. Transient Thermal Response Curve** 



#### **Mechanical Dimensions**

### TO-220-2L





#### NOTES:

- A. PACKAGE REFERENCE: JEDEC TO220 VARIATION AC.
- B. ALL DIMENSIONS ARE IN MILLIMETERS. C. DIMENSION AND TOLERANCE AS PER ASME
- Y14.5-2009
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- F. FAIRCHILD SEMICONDUCTOR

**Dimensions in Millimeters** 





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