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ON Semiconductor®

# RURD660S9A-F085 Ultrafast Power Rectifier, 6A 600V

## Features

- High Speed Switching (  $t_{rr}=63\text{ns(Typ.)}$  @  $I_F=6\text{A}$  )
- Low Forward Voltage(  $V_F=1.26\text{V(Typ.)}$  @  $I_F=6\text{A}$  )
- Avalanche Energy Rated
- AEC-Q101 Qualified

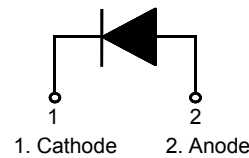
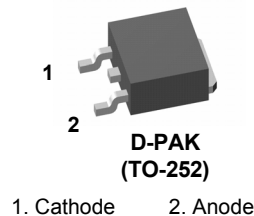
## Applications

- General Purpose
- Switching Mode Power Supply
- Power switching circuits

## 6A, 600V Ultrafast Rectifier

The RURD660S9A-F085 is an ultrafast diode with soft recovery characteristics ( $t_{rr}< 83\text{ns}$ ). It has a low forward voltage drop and is of 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 soft recovery minimize ringing and electrical noise in many power switching circuits, thus reducing powerloss 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 @ $T_C = 25^\circ\text{C}$	6	A
$I_{FSM}$	Non-repetitive Peak Surge Current	60	A
$T_J, T_{STG}$	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	3	$^\circ\text{C/W}$
$R_{\theta JA}^1$	Maximum Thermal Resistance, Junction to Ambient	140	$^\circ\text{C/W}$
$R_{\theta JA}^2$	Maximum Thermal Resistance, Junction to Ambient	50	$^\circ\text{C/W}$

## Package Marking and Ordering Information

Device Marking	Device	Package	Tube	Quantity
RUR660	RURD660S9A-F085	TO-252-2L	-	60

### Notes:

1. Mounted on a minimum pad follow by JEDEC standard.
2. Mounted on a 1 in2 pad of 2 oz copper follow by JEDEC standard.

RURD660S9A-F085 Ultrafast Power Rectifier, 6A 600V

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

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units	
$I_R$	Instantaneous Reverse Current	$V_R = 600\text{V}$	$T_C = 25^\circ\text{C}$	-	-	100	$\mu\text{A}$
			$T_C = 175^\circ\text{C}$	-	-	500	$\mu\text{A}$
$V_{FM}^3$	Instantaneous Forward Voltage	$I_F = 6\text{A}$	$T_C = 25^\circ\text{C}$	-	1.26	1.5	V
			$T_C = 175^\circ\text{C}$	-	1.04	-	V
$t_{rr}^4$	Reverse Recovery Time	$I_F = 1\text{A}, di/dt = 200\text{A}/\mu\text{s}, V_{CC} = 390\text{V}$	$T_C = 25^\circ\text{C}$	-	25	33	ns
			$T_C = 175^\circ\text{C}$	-	63	83	ns
$t_a$	Reverse Recovery Time	$I_F = 6\text{A}, di/dt = 200\text{A}/\mu\text{s}, V_{CC} = 390\text{V}$	-	23	-	ns	
$t_b$	Reverse Recovery Time	$I_F = 6\text{A}, di/dt = 200\text{A}/\mu\text{s}, V_{CC} = 390\text{V}$	-	40	-	ns	
$Q_{rr}$	Reverse Recovery Charge	$I_F = 6\text{A}, di/dt = 200\text{A}/\mu\text{s}, V_{CC} = 390\text{V}$	-	151	-	nC	
$W_{AVL}$	Avalanche Energy (L = 20mH)		10	-	-	mJ	

**Notes:**

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

**Test Circuit and Waveforms**

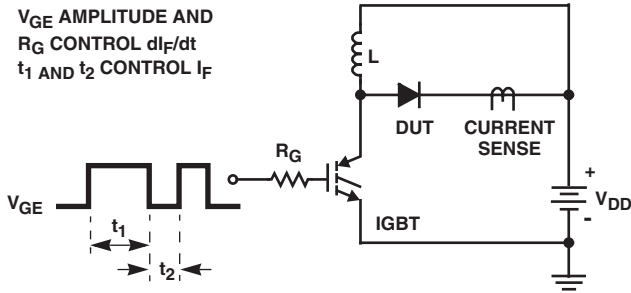


FIGURE 8.  $t_{rr}$  TEST CIRCUIT

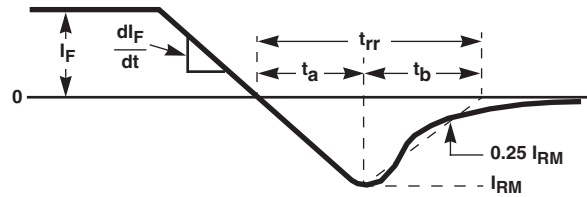


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

$I = 1\text{A}$   
 $L = 20\text{mH}$   
 $R < 0.1\Omega$   
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q_1 = \text{IGBT (}BV_{CES} > \text{DUT } V_{R(AVL)})$

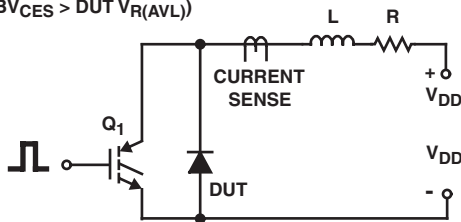


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

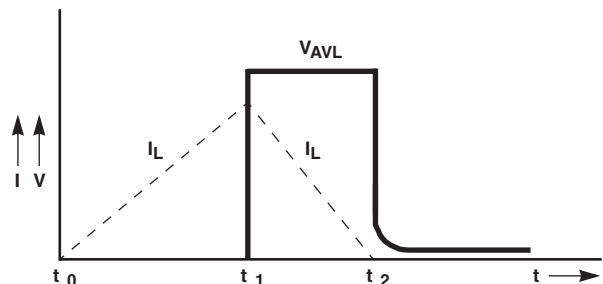
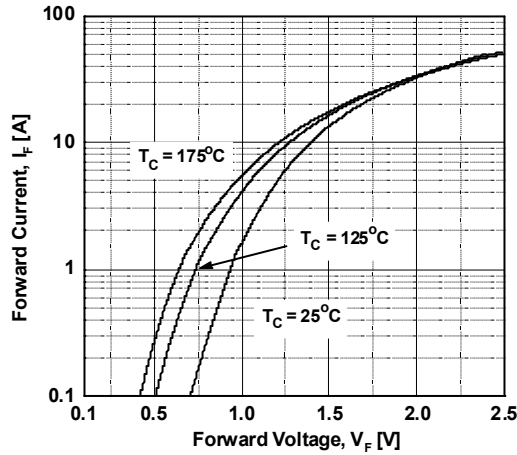


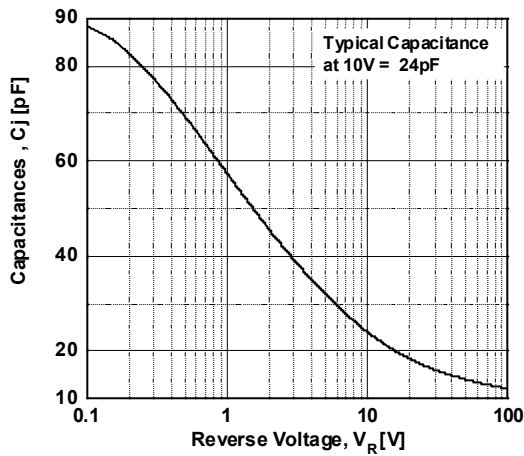
FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

## Typical Performance Characteristics

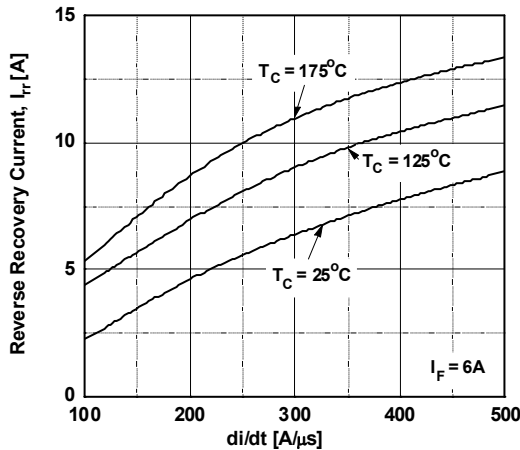
**Figure 1. Typical Forward Voltage Drop vs. Forward Current**



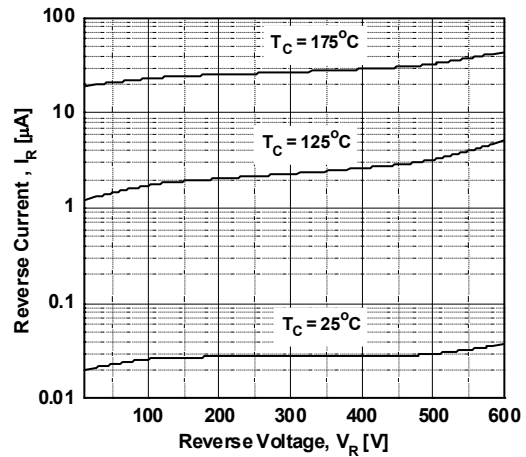
**Figure 3. Typical Junction Capacitance**



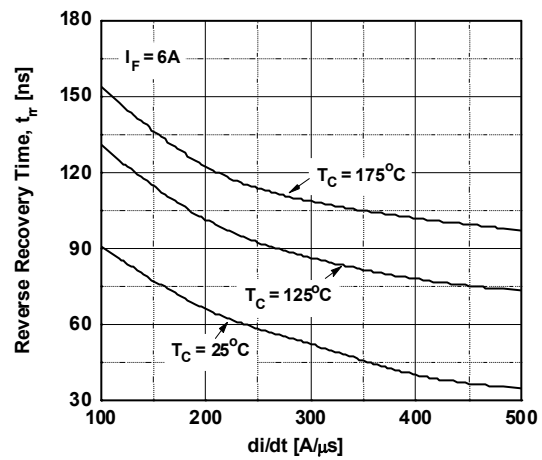
**Figure 5. Typical Reverse Recovery Current vs. di/dt**



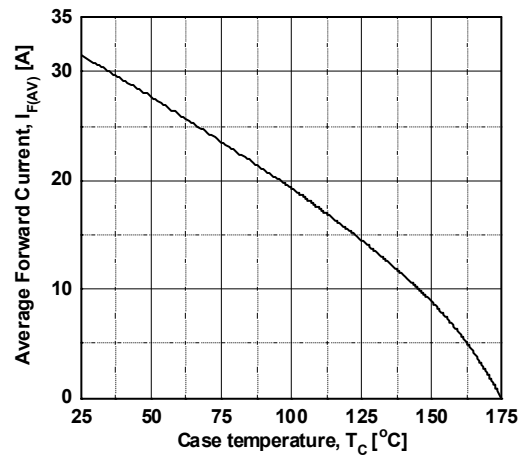
**Figure 2. Typical Reverse Current vs. Reverse Voltage**



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



**Figure 6. Forward Current Derating Curve**



Typical Performance Characteristics (Continued)

Figure 7. Reverse Recovery Charge

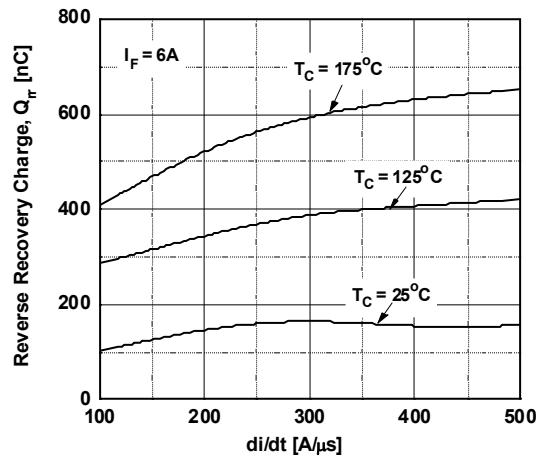
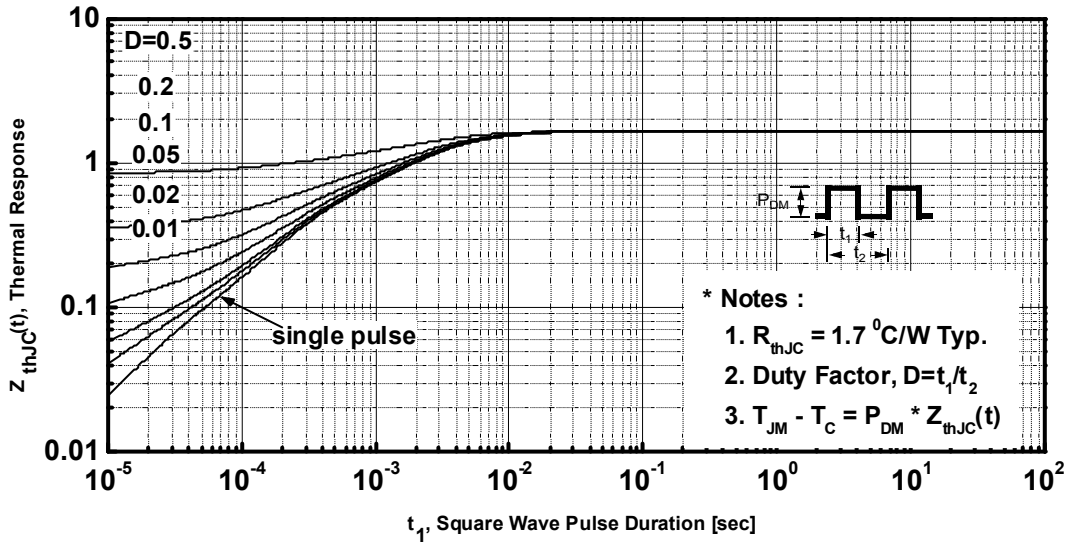
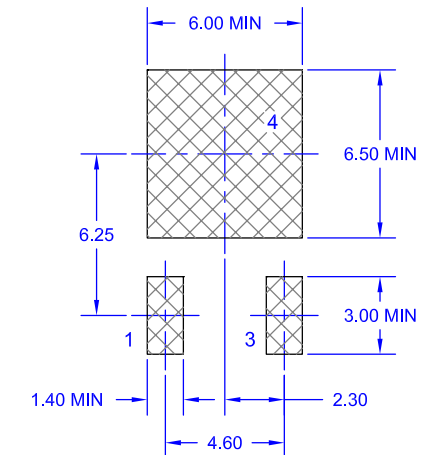
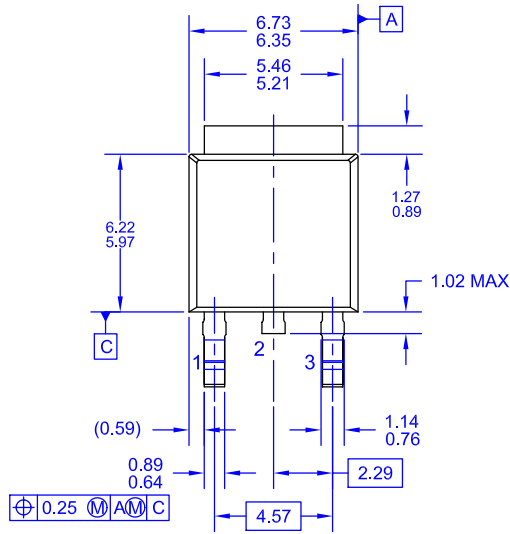


Figure 8. Transient Thermal Response Curve

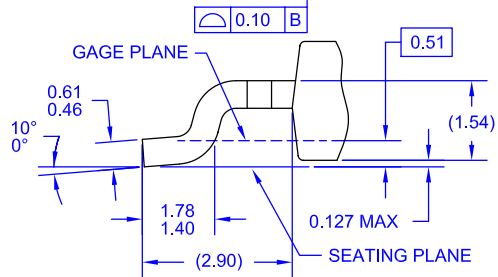
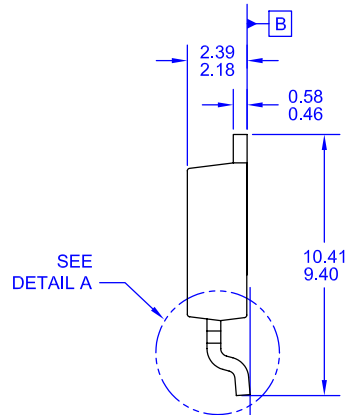
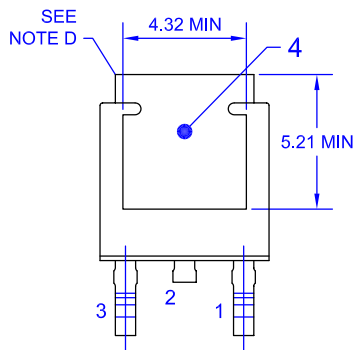


Mechanical Dimensions

D-PAK




LAND PATTERN RECOMMENDATION



- NOTES: UNLESS OTHERWISE SPECIFIED
- A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE C, VARIATION AA.
  - B) ALL DIMENSIONS ARE IN MILLIMETERS.
  - C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
  - D) HEAT SINK TOP EDGE COULD BE IN CHAMFERED CORNERS OR EDGE PROTRUSION.
  - E) PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL.
  - F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
  - G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO220P1003X238-3N.
  - H) DRAWING NUMBER AND REVISION: MKT-TO252A03REV8

Dimensions in Millimeters



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